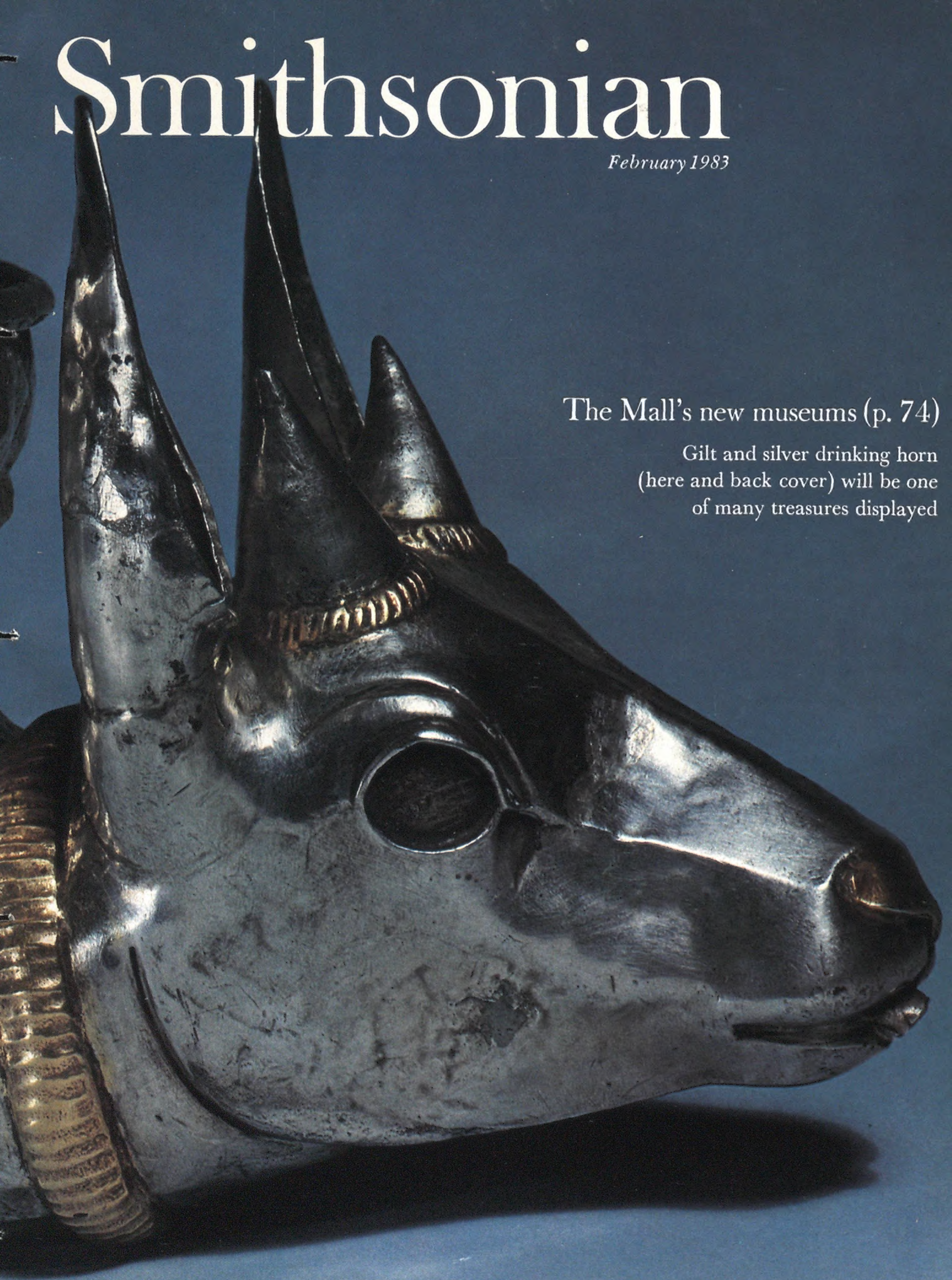
Smithsonian

February 1983



The Mall's new museums (p. 74)

Gilt and silver drinking horn (here and back cover) will be one of many treasures displayed

A L A

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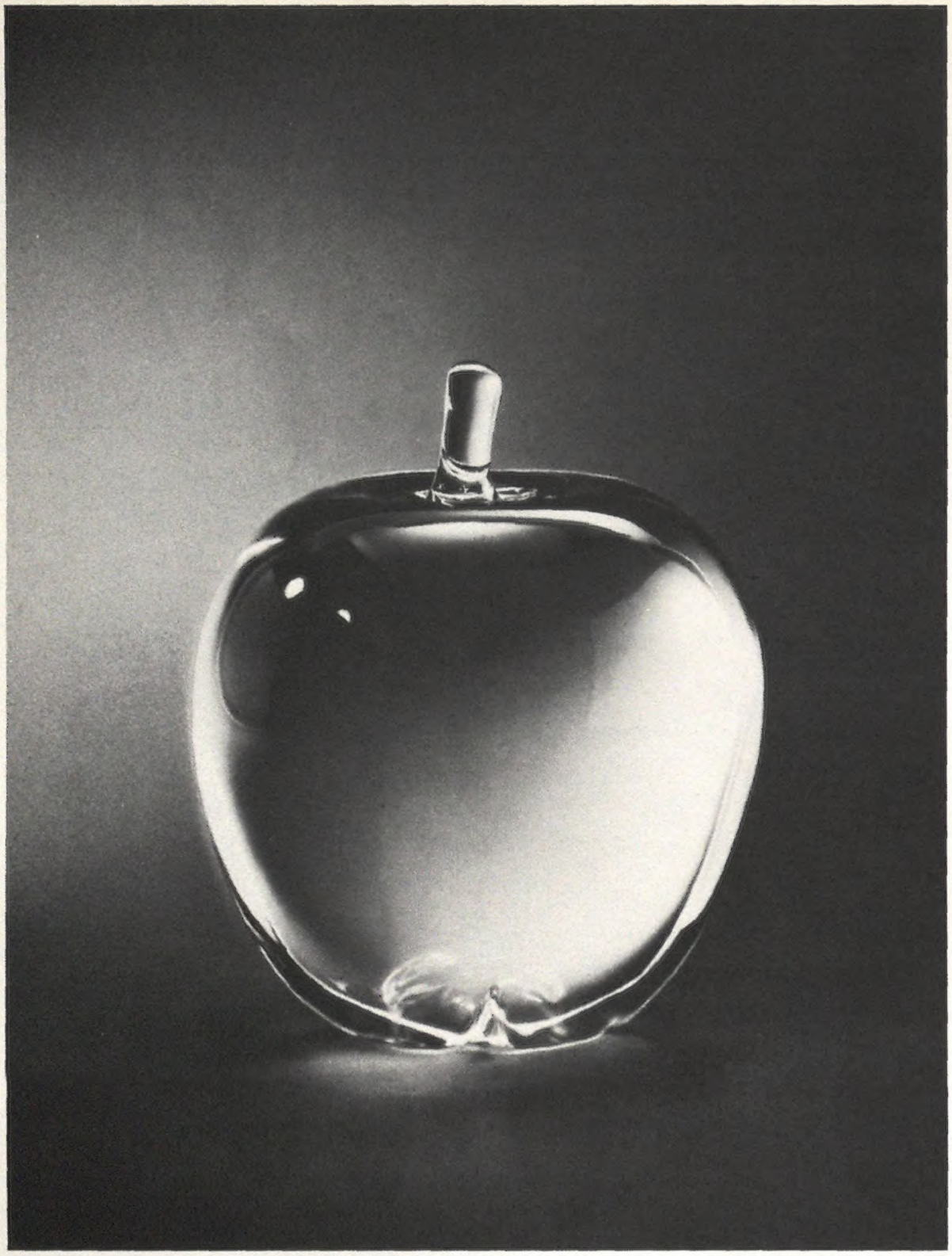

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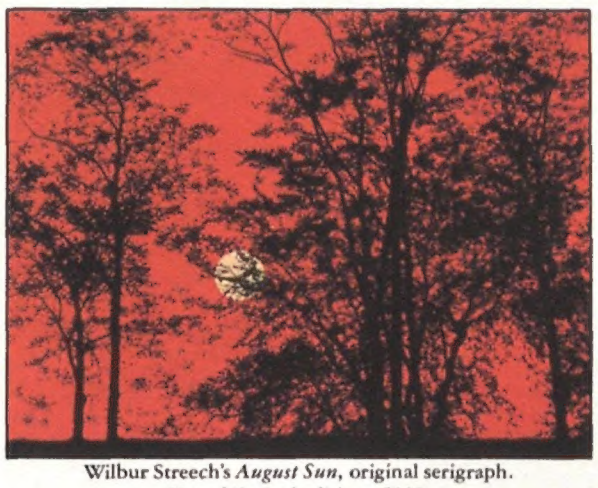

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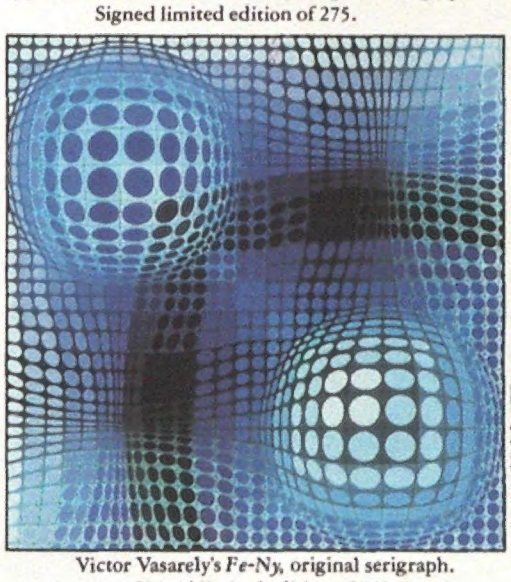

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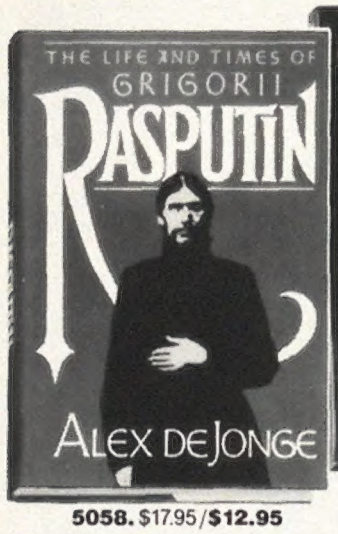

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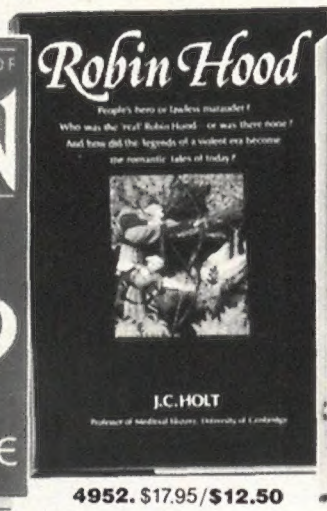

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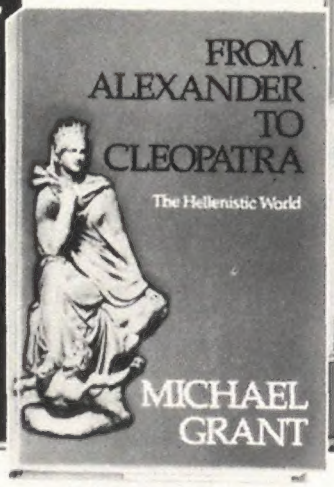

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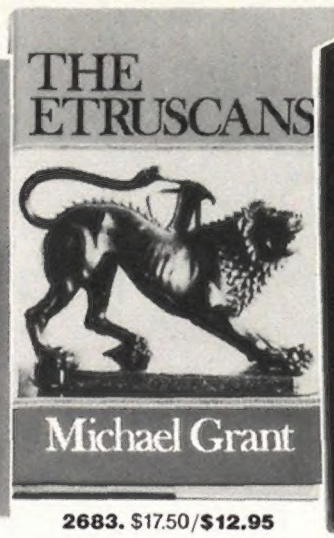

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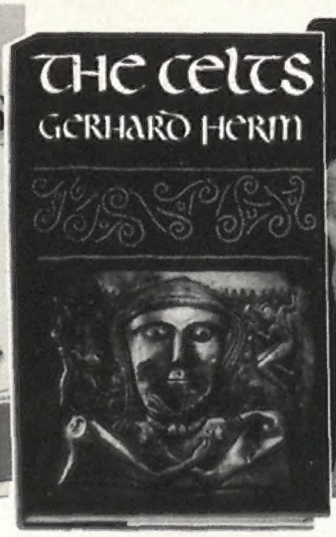

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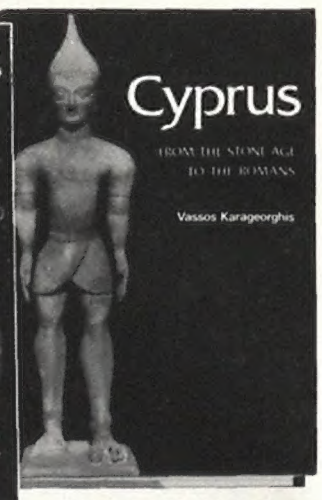

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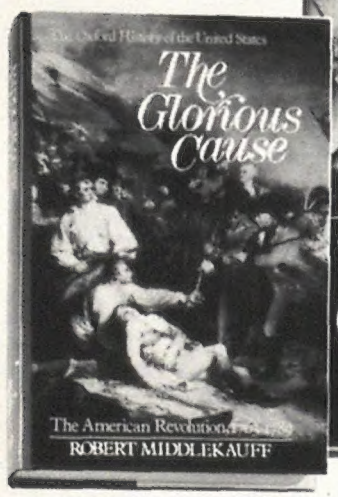

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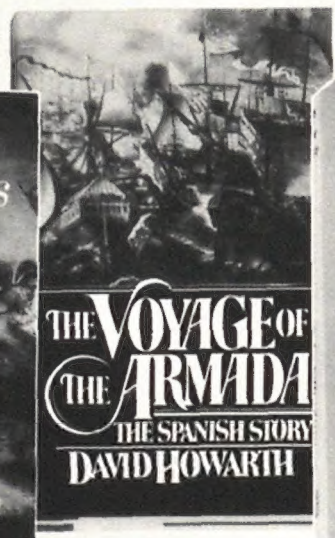

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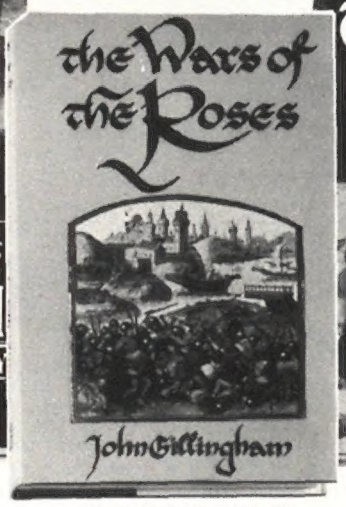

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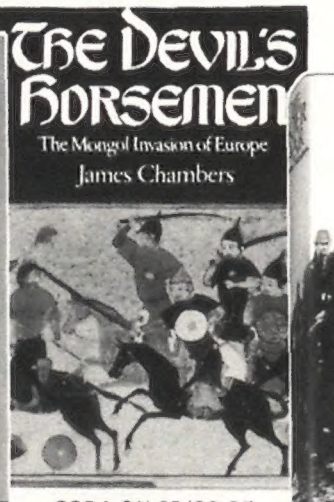

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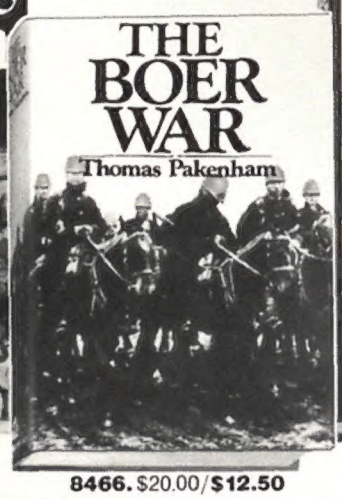

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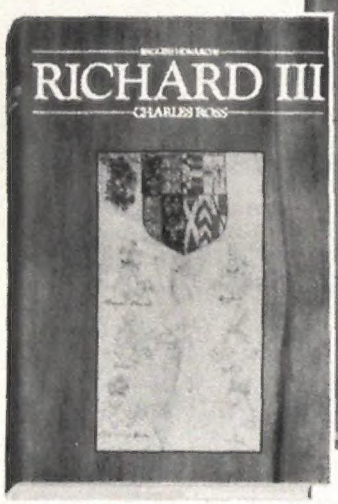

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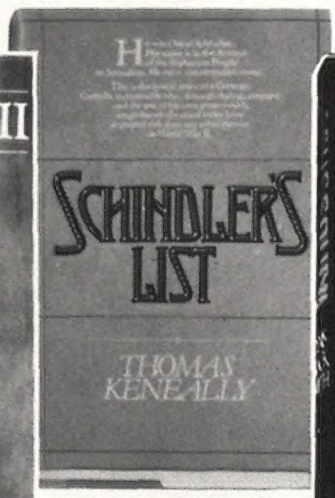

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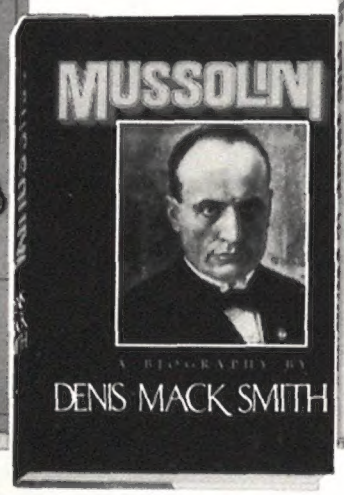

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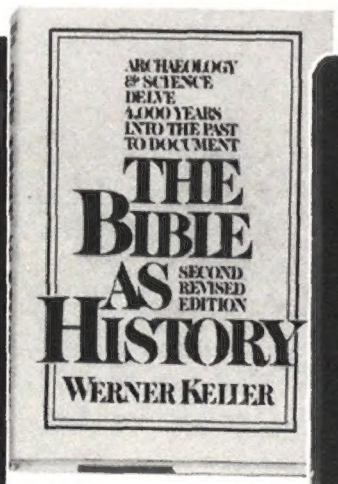
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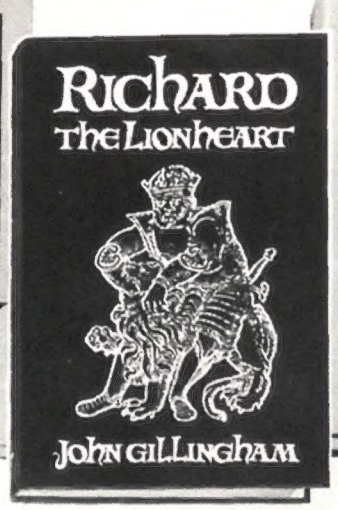

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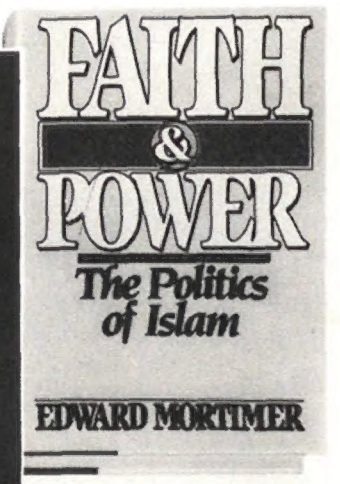

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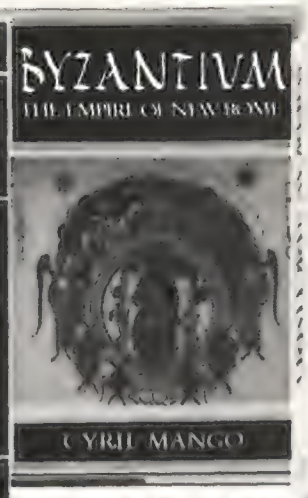

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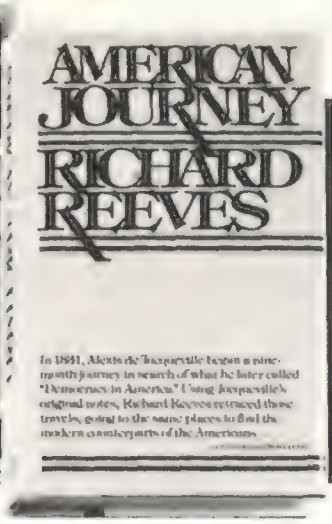

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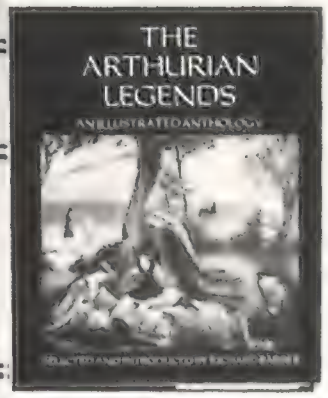

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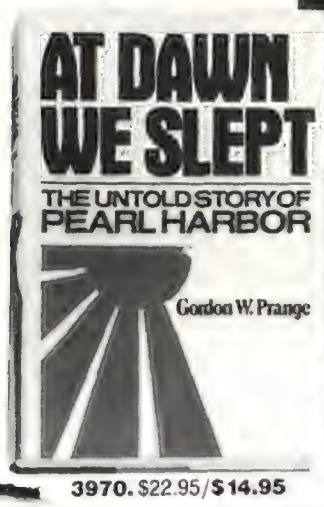

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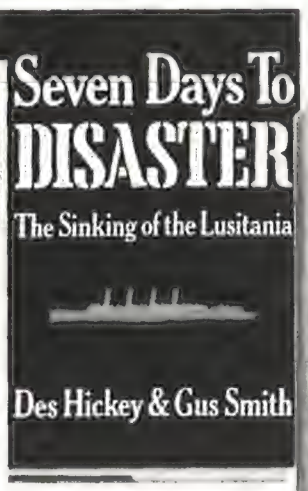

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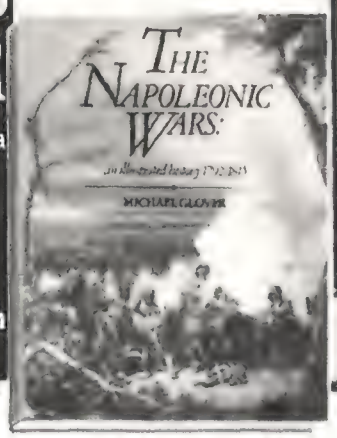

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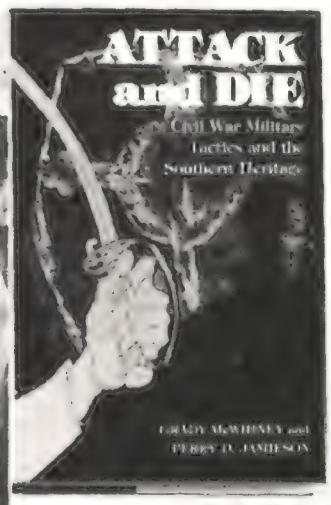

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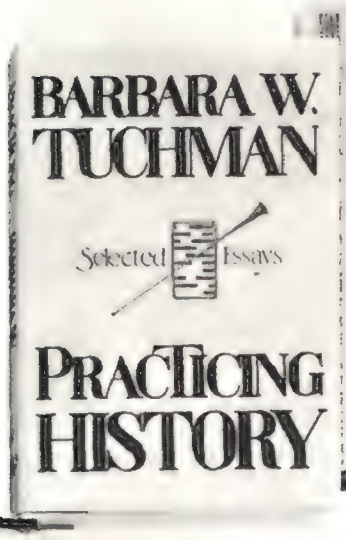

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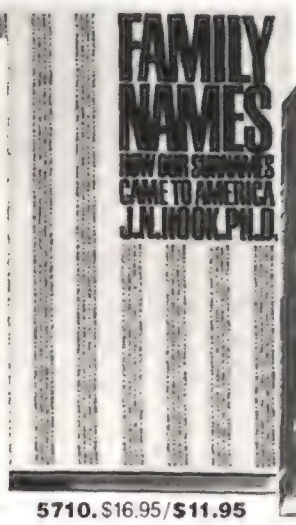

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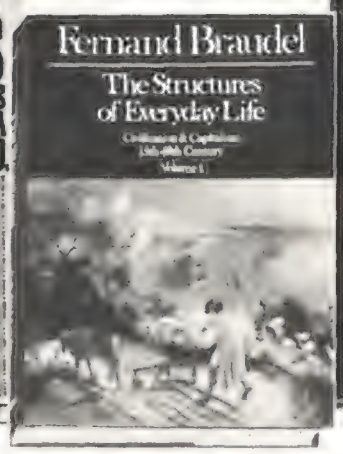

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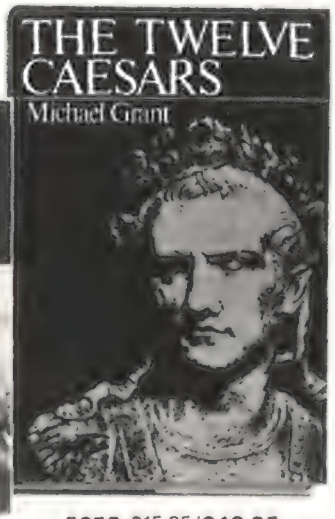

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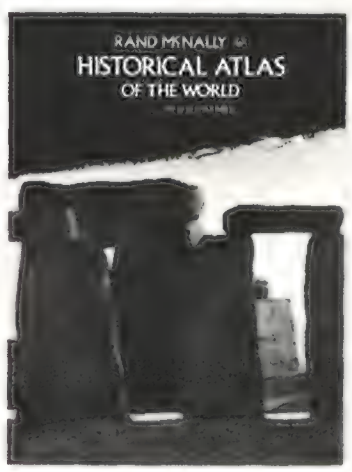

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Letters to the Editor

Small hydroelectric plants

Dear Sir: Referring to your December article, I see a major economic fallacy in the current enthusiasm for development of these small power plants. I write as one who put in a small water-power installation to run a cider and grist mill some 25 years ago.

The problem is that most of these small installations are on streams of uncertain flow. Many must shut way down or even off entirely during two or three months in summer, and in northern areas often must cut back during extremely cold winter periods. They cannot therefore be depended on for a constant source of power. People often hark back to the old days when each brook turned ten or 15 small water wheels, and assume we can do it again. (Brooks seldom quit entirely and dams impound enough water to keep things running for a short time without resorting to electricity. In olden times, people had to plan ahead or do without; most sawing, for example, was done during heavy spring runoff. Even today, I myself have been able sometimes to run my mill only two hours a day.) But as long as we demand 24-hour electric service we must continue to build standby capacity of some sort, nuclear or otherwise, for those periods when the small plants cannot operate. This means a costly and uneconomic duplication. By all means harness the small brooks for onsite use for when there is adequate water power, but don't depend on them for 24-hour, 12-month service.

Herbert G. Ogden
Windsor, Vermont

Art Deco

Dear Sir: In March of 1941 we spent our honeymoon on lower Miami Beach, in the area covered in your article. After 26 hours on the old Seaboard Air Line Railroad's "Silver Meteor" (still making the run, but now for Amtrak) we were met at the train station by a limousine and driven to our hotel, the Breakwater. In our family album is a picture of my wife, sitting on the porch in front of those windows with flamingos etched on the glass. What a pleasant surprise it was to find the very same windows pictured in SMITHSONIAN! How nice it is to know that some things have not been destroyed by time or vandals.

J. J. Brenner
Silver Spring, Maryland

John Breckinridge

Dear Sir: We dyed-in-the-cotton Southerners continue to cringe when prestigious publications refer to the 1861-65 War Between the States as the "Civil War." Webster's Third New International Dictionary defines "civil war" as "war between different sections or parties of the same country or nation."

When the 11 states of the South seceded from the United States and formed the Confederacy, a separate nation was formed, with its own government. While geographically a part of the United States, the South stood independently with a recognized political identity. We in the South are tenacious and vociferous in our preference for a correct terminology—War Between the States or War for Southern Independence.

Also, you refer to "Colonel J. J. Dickison, 'the swamp fox of the Confederacy.' " The gentleman is an ancestor in whom I take great pride, even though we disagree on the spelling of our family name.

Josephyne Dickson Ziegler
Jasper, Alabama

Antique motorcycles

Dear Sir: While working as a lithographer in Springfield, Massachusetts, in the 1930s I learned that, while other companies made motorcycles, Indian made motocycles. We printed the Indian Motocycle Company's newsletter ("the voice of 90,000 riders") as well as advertising posters and component parts lists. One poster,

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published after every important race, trumpeted "INDIAN WINS AGAIN!" Indian was a "winner" if it placed anywhere in the top ten.

Indian's fine old building was still standing in Springfield a few months ago when last I went by, but city planners want to develop it into another hole in the ground.

James H. Wareham
Ludlow, Massachusetts

Dear Sir: Restoring a motorcycle is the most intimate and sensual relationship possible between man and machine. I applaud Dorothy and Jack Fields for exposing your readers to this joy.

John T. Streck
Romulus, Michigan

Goats

Dear Sir: The "keepers of the faith" in the goat world applaud Robert Wernick's article exploding many myths about this extraordinary animal and telling what it is really like. These dedicated and devoted breeders—among them the late Mrs. Carl Sandburg, wife of the poet, with her Chikaming herd in North Carolina—have maintained and upgraded the quality of various breeds.

Some years ago we drove up a rocky dirt road 13 miles off the highway to buy two lovely Nubian does from the Monastery of Christ in the Desert on the Chama River in Abiquiu, New Mexico. When we moved to Florida I had to sell them. I cried. The goats cried. Yes, they truly did. I couldn't believe it, but there they were—with real tears coursing down their cheeks.

In Gainesville I kept a Nubian buck, and ran a stud service for the neighborhood of university professors' families, who liked goat's milk. Black Jack loved to play with—and occasionally butt—my children and their friends.

Back in New Mexico, I went shopping for a Nubian buck. One rambunctious fellow jumped up on the fence, made a lot of noise and spit in my face. Buck talk! He is now my herd sire, a wonderful guy.

Ruth S. Gervais
Roswell, New Mexico

Dear Sir: Robert Wernick cites many useful products derived from the maligned goat. Some seem to defy replacement, even by 20th-century devices.

What is needed in a time when people are keeping their cars longer, is a car people can be proud of longer. That's why, in 65 plants across the country, over 1000 Employee Involvement Groups have been established by Ford Motor Company and the UAW.

Their goal? Build the highest quality cars and trucks in the world. So you'll buy the results of their labor instead of someone else's. For example, members of this group at the Ford Lorain Assembly Plant set out to protect the 1983 Cougar's aerodynamic new body. Months before the first car was due to roll off the assembly line. They knew if their new Cougar was going to survive the rigors of the real world, it had to have a tough skin. So working with Ford management and engineers, Lorain employees used their on-the-job experience to help set up new computer-guided spray equipment. A system specifically designed to apply paint and primer more uniformly to the Cougar's dramatic new shape. Thus enhancing the quality of the car's finish as well as its looks. And that's only one example of 129 employee-inspired quality improvements adopted by Ford management on the new 1983 Cougar. Employees speaking and management listening. Another reason Ford Motor Company achieved the highest quality rating of any major American car or truck maker. A fact based on a national survey measuring things gone wrong conducted among 11,000 people owning Ford and competitive 1982 new vehicles.

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When the Persian prince Cyrus the Younger marched across Anatolia in 401 B.C. to battle his brother Artaxerxes II, he paused beside the Euphrates to build goatskin rafts to ferry his soldiers across the river to provision at Charmande. The historian Xenophon, a member of the party, duly recorded the event.

Similar rafts were being built, when I visited Diyarbakir on the upper Tigris in June 1957, to ferry steel pipes downstream for a modern water system at the small town of Cizre. One raft then under construction was noted to be ten goats wide by 14 goats long. Another had been completed and was loaded with what appeared to be ten or 12 tons of steel pipe. Near the center of the raft was living space for the one-man crew. I was told the trip would take five or six days, with nightly stops on sandbars or islands.

"The more things change. . . ." Xenophon please note.

Kenneth N. Phillips
Portland, Oregon

Dear Sir: As the owner—well, who owns whom is sometimes in question—of four does, I can attest that goats are an economical, productive animal. They eat poison ivy, wild rose thorns and other trash as well as grass. As top browsers, they are perfectly compatible with our two ewe sheep, which crop the grass closer to the ground.

Goat's milk is rich and tasty; goat's butter is white and delicious. Our goats are so tame and loving that our daughter has cared for them since she was nine.

They are independent spirits and great breakout artists, delighting in watching my husband repair a breach in the fence. After he has picked up all his tools, they calmly walk through or jump over another spot they've been eyeing—after making sure he is watching them.

Barbara Libarkin
Lovettsville, Virginia

Dear Sir: Mr. Wernick's article overlooks several roles that goats have played on the American scene:

As draft animals. In the early years of this century, goat carts were popular with children lucky enough to have a place to stable the animals. I actually rode in a cart drawn by two goats, owned by my Washington cousins, about 70 years ago. And Porgy's goat cart was immortalized in *Porgy and Bess.*

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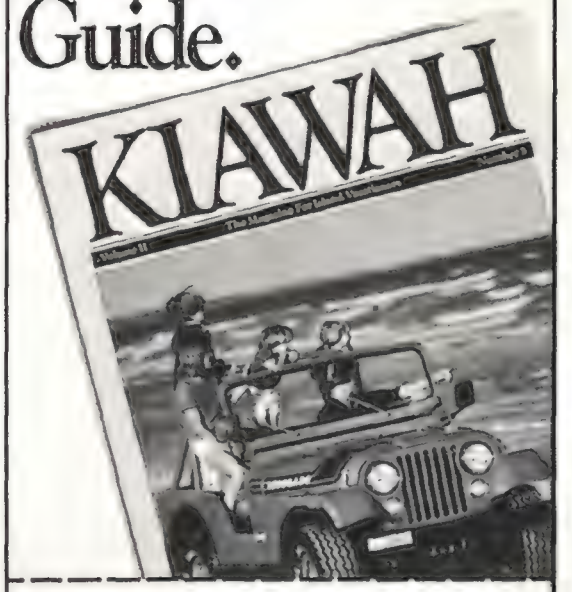

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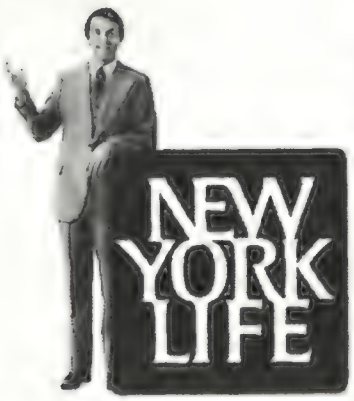

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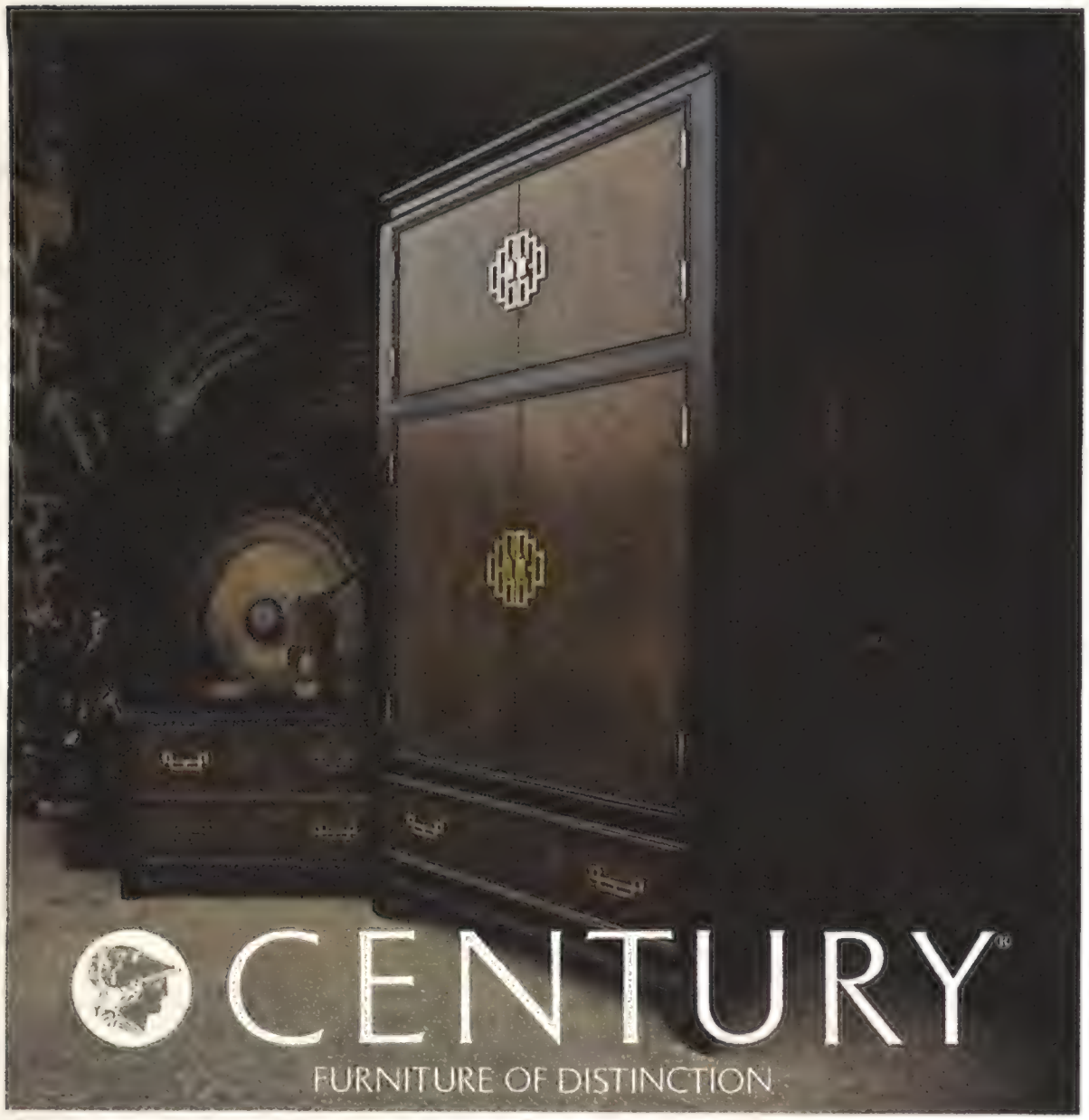

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As mascots. A series of "Bills" has been famous as the Naval Academy mascot for 22 years, always leading the Mids onto the field at Army-Navy football games.

At racetracks. High-strung, nervous thoroughbreds need calming companionship in their stalls. While dogs are often used, goats seem more compatible.

For dietary purposes. Goat's milk is prescribed for people who cannot digest cow's milk. Mahatma Gandhi was a well-known user and advocate.

Louis F. Cahn
Baltimore

Vatican treasures

Dear Sir: Referring to the vestment pictured on page 130 and described as a ". . . chasuble of Pope Clement VIII, worn in the Sistine Chapel," this may have been part of the vestments used in the Sistine Chapel but it is not a chasuble. It is instead a dalmatic, the garment worn by the deacon at solemn High Mass. Hence Clement VIII, as Pope, never wore this vestment; he would have worn the cope, or large cape, upon entering, and then for the actual Mass, the chasuble, which is sleeveless.

Msgr. Henry P. Cosgrove, JCD
Our Lady of Lourdes Church
Queens Village, New York

Mall and Phenomena

Dear Sir: The first subjects raised in Editors Park and Wiley's columns just happened to come together for me last year in a most interesting way.

One sunny fall afternoon I was up in my Lazair ultralight looking for thermals. Birds, especially hawks, are one of the clues I find useful for locating the stronger updrafts. I spotted a large hawk circling off to the south and about 1,000 feet below me. After moving in over him, I throttled back, waiting for the lift to reach me. When it did, I cut the engines and pulled into a tight circle.

The hawk, with his much more efficient airframe, was soon circling about 25 feet below me, so close I could see his eyes move. As we circled together I admired the beautiful bird, envying its freedom and flying ability. The lift petered out and we went our separate ways, but I'll never forget that hawk.

Richard L. Brown
Bellevue, Nebraska

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JAGUAR

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—Dave Brubeck

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And all the *classics and hits* of jazz will be here. Unforgettable performances of 'St. James Infirmary' by Jack Teagarden, 'China Boy' by Eddie Condon, and 'Star Dust' by Lionel Hampton.

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To subscribe now, mail the accompanying application to The Franklin Mint Record Society, Franklin Center, PA 19091, by February 28, 1983.

Louis Armstrong, Stan Getz: Photos by Robert Parent; Ella Fitzgerald: Photo by Raymond Ross; Lionel Hampton, Dave Brubeck: David Redfern/Retna Ltd.; Benny Goodman: Rex Features Ltd.; King Oliver's Creole Jazz Band: Courtesy of the Tulane University Jazz Archive.

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Around the Mall and beyond

The National Air and Space Museum put together an art show before Christmas that lured me over there with very little trouble. It's a collection of 90 illustrations (on loan from NASA, which commissioned them) by 40 artists dealing with the space-shuttle program. Not necessarily artists who specialize in this subject, mind you, for one of the ideas was to show how the space-shuttle events—preparation for the flight, blast-off, landing—could be expressed in varied ways.

Shown here is a pre-launch view of *Columbia*'s first flight from the press seats at Cape Canaveral by Arthur Shilstone, who is an old friend of this magazine. He did the paintings for our story of the Battle of Yorktown in October 1981. Shilstone has, I think, more coverage of the space shuttle than anyone else—I counted ten of his works, ranging from the pre-flight testing of *Enterprise* to the rooster tail of desert dust pluming behind as it landed. His view of the rollout, the inching progress of the upright spaceship *Enterprise* on giant tractor treads, is as memorable as this scene of a distant diva, *Columbia*, onstage, preparing for her aria.

Other artists covered other things. Henry Casselli showed the thoughtful faces of the astronauts—young men reflecting the tension of the moment. Not fear, exactly, but the absorption in juggling mental requirements, of getting their ducks in a row.

The art ranges from a classical oil to a wild abstraction to a few paintings of photographic realism. Some artists found unexpected moments—scenes or vignettes after the blast-off, after the landing. All open our eyes to unappreciated drama, unrealized emotions, unasked questions. The show will be with us until Labor Day.

Down the hall from the art gallery at NASM is the gallery that displays naval aviation. As everyone remembers, it's in the form of the hangar deck of an aircraft

Arthur Shilstone calls his watercolor of *Columbia* launch *1:07:22 and Counting.*

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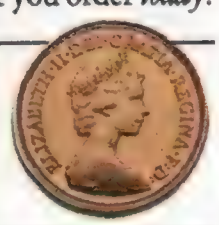

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carrier, complete with sound effects of a tweeting bos'n's pipe and amplified bellows of "Now hear this. . . ."

Outside the entrance to this gallery is a model of the carrier USS *Enterprise* (p. 24), the world's first nuclear-powered carrier, which was presented to the museum by its builder, Stephen Henninger. He recently showed up to add a couple of models of Navy aircraft to the 83—all meticulously in scale—that crowd the flight and hangar decks of the ship model. And while he was on hand, my friend Ann Carroll interviewed him for our new television series called "Here at the Smithsonian." It consists of two-minute glimpses of people and exhibits that are used on news or "magazine" programs by about 50 television stations.

Henninger said he had always been a Navy enthusiast, interested in doing really good ship models. He set to work on CVN-65 (which is what Navy buffs call USS *Enterprise*) in the 1960s, choosing it because it was so well known at that time. He worked on it for about 12 years, putting in, he thinks, about 1,000 hours a year. He still adds little things to it as they occur to him, but essentially the ship is finished. When he showed up and was interviewed, it was after he had carefully placed a TA-4, the trainer version of an A-4 Skyhawk, and a C-1, a Grumman propeller-driven transport, on the flight deck. He put them there because the ship would have had them "in real life."

Steve used kits for many of the planes, but fashioned others from scratch to make sure every detail was correct. His authenticity is eerie. While I was viewing the model during a break in the TV interview, Tim Wooldridge, a curator of aeronautics at the museum, joined me. He pointed to a tiny companionway (that's a stairway, for all you people living in Kansas) leading down from the flight deck to an equally tiny gallery just below, where there was an opening. "My cabin was right in there," said Tim. "Right under the Number One catapult."

Tim served on USS *Enterprise* (the real one, I mean) from 1961 to 1963, with the Sixth Fleet in the Mediterranean and through the Cuban missile crisis. He was an F-4 pilot. That was the Phantom II, a fighter still used by many air forces.

When Henninger wrote the museum in 1981 about his model, offering it for dis-

Family portrait, circa 1992, 2016, 2045, 2078, 210

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Detail of *Enterprise* model shows "island" from which the carrier is controlled.

play, the letter was bucked to Tim because of his obvious interest. Now, the Smithsonian doesn't get very excited about a lot of the things that are offered it. Since we have more than 76,000,000 objects tucked away in our innards, with a very small proportion on view, we're pretty apt to *have* whatever-it-is already. But in the field of Air and Space new things are constantly happening and new objects appearing. So offers are taken rather seriously.

When photographs of the model arrived, Wooldridge and Noel W. Hinners, then museum director, were impressed enough to tell Henninger to press on with it. The young man was living in Boulder, Colorado, in a trailer. Hinners dropped by to visit him and found he had built a wing on the trailer to house the 11-foot model. One careful look, and Hinners was sold on it.

The television camera was ready to go again, and Tim and I moved away to leave the field open. Ann asked her questions. Steve said he had worked on the model for a while in Peru where life was very quiet. It's made out of materials that give it a long life. The deck cannot be taken off. The hardest job was building some of those planes from scratch, tiny bit by tiny bit.

There was one question I wanted to

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ask if Ann didn't. When she neared the end of her two minutes she said to Steve, "I know this is silly, but . . ." and right here I knew she would ask it after all: ". . . will it float?"

No, Steve told her (and me), because it's not ballasted and would simply capsize.

I have a rowboat that's two feet shorter than CVN-65. It's also worth a fraction of the model. And it's comparatively dull to look at. But the last time I checked, it would float.

In the mood for models, I had a gratifying dose of them at the Navy Memorial Museum, which reopened after a hiatus for renovation. The museum resides in the Washington Navy Yard in a long, echoing building—one of several that stood on this site and were used to make cannon back when this was the Naval Gun Factory. The factory fashioned the great Dahlgrens of Civil War days, the turret guns that blasted the Spanish fleet at Santiago, and even all of those 16-inchers that softened beachheads in World War II.

When the factory closed in the 1960s, these foundry and gun-assembly buildings were underutilized, and one of them, in fact, became the home of the barn owl whose private life I revealed in a column about two years ago. But this particular gun building, close to the banks of the Anacostia River, was set aside as a museum, and now, after its renewal, takes its place as a most delightful spot to visit.

The central area of the long room is taken up by the fighting top—a sort of flying deck set high in the mast where marines would have a field of fire during combat—of the USS *Constitution*, "Old Ironsides," which lies in the Boston Navy Yard as a commissioned ship—and certainly the most visited vessel in the United States. Since she's 185 years old, bits and pieces of her are constantly being replaced. That fighting top thus could be sent to the museum. I took a special interest in this large piece of Old Ironsides because I have a very small piece of her myself. When I was about ten I was asked, along with several million other American schoolchildren, to cough up a few pennies to help pay for the old vessel's current repairs. That was a fairly big sacrifice for a kid back then: a penny generally went straight into the gum machine. It was the first time the U.S. government ever put the bite on me, and I came through so readily that they got the habit.

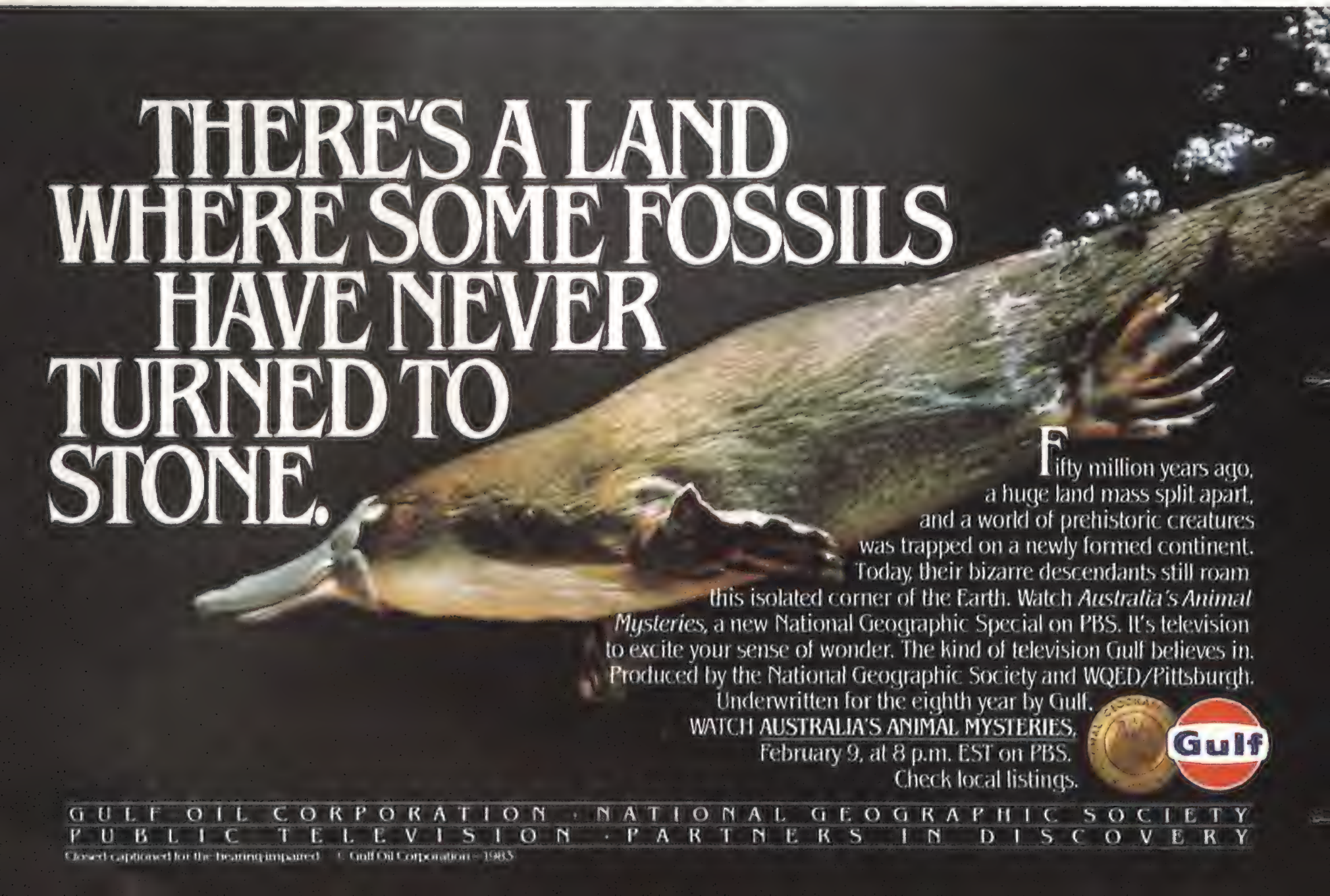
Anyway, in return for my pennies, I was given a little sliver of presumably ancient oak. It didn't taste as good as gum, nor chew as well, and if I can unearth it I might send it along to the Navy Museum.

Eventually a replica of *Constitution*'s gun deck will be set up in the museum so that you will walk toward the great muzzles peering out at you from gunports, and then go inside to see how they were manhandled and fired.

One of the proudest exhibits is the research submersible *Trieste*, which took Man to his deepest point—a depth of about seven miles—in the Mariana Trench of the Pacific on January 23, 1960.

The models are everywhere. They range from a little ship made of bone by French prisoners of war in Nelson's day to a huge landing craft done with Navy thoroughness. It's three times the size of my rowboat, but I'm sure it can't float.

Edwards Park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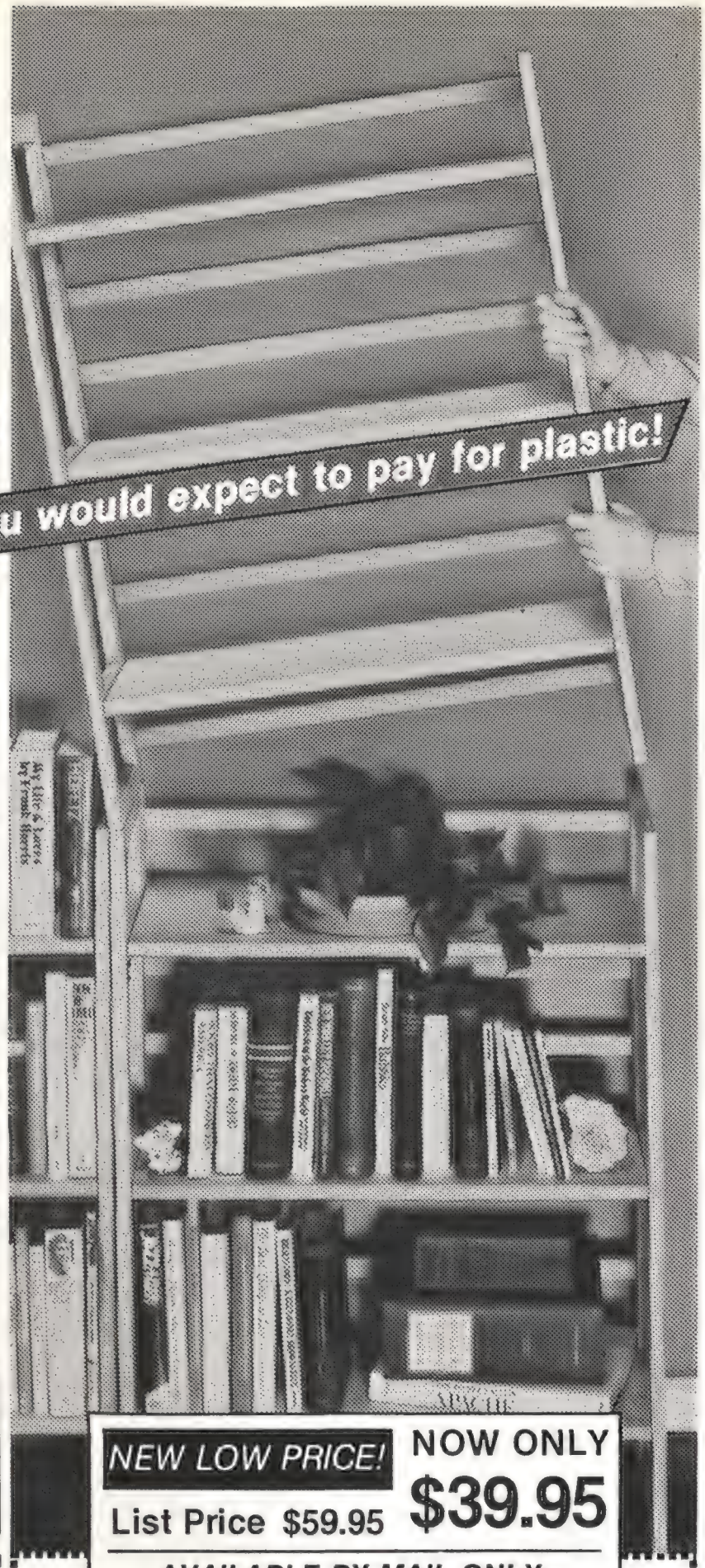

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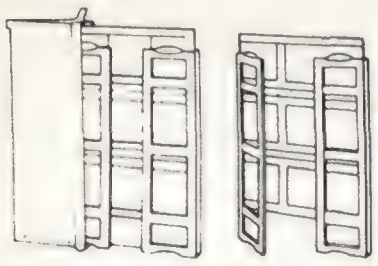

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The 1979 cultural-exchange accord between America, China has brought about 9,000 Chinese scholars here

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Nothing quite like this exchange of scholars between the Pacific powers has been undertaken before. The best and the brightest have been chosen from China's academic institutions; approximately 9,000 Chinese are now (or recently have been) working and studying in research centers in nearly every part of the United States. They range in age and interests from 23-year-old mathematics whiz Xu Pei (p. 32) at Stanford to political scientist Yao Wei, a 52-year-old former fellow at Harvard, Stanford and the Woodrow Wilson Center for Scholars in Washington, D.C. Their way has been paid by stipends from the Chinese government and grants from American universities, along with financial and moral support from relatives and friends and, in more than a few instances, sheer grit and individual determination to make ends meet.

Interviews recently with some 30 exchange scholars in three great academic centers—Harvard; the University of Cali-

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Xu Pei, 23, is studying for his PhD in pure mathematics at Stanford.

fornia, Berkeley; and Stanford—yielded an unvarying conclusion: the program indeed has promoted greater understanding. The visiting Chinese come from a country whose life-styles and institutions are understandable to Americans only after years of study, and yet, with only a few exceptions, they seem to have adjusted smoothly.

One gets a sense of enthusiasm from these scholars. Consider Zheng Shipeng, when I met him a graduate student at Harvard sponsored by the Harvard-Yenching Institute. In his mid-20s and one of the younger participants in the program, Zheng specialized in intergovernmental politics at Fudan University, Shanghai. Taller than most Chinese, he had the smiling good nature one usually finds behind the sterner face demanded by modern Chinese concepts of industry and discipline. A light-gray pullover gave him a preppy, undergraduate look.

Studying political science, Zheng was atypical of visiting Chinese students (most are scientists and engineers) and talked about the difference between our two worlds. "You in America are almost completely individualistic, the stress is on the success of the individual; in China, the individual is committed to the good of the whole society—that, at least, is the ideal." His grin was friendly; we had a great deal to learn from each other.

Qi Songping spent nearly a year and a half at Berkeley. Her husband in Beijing —she has been married for more than 20 years—is a computer engineer, and they have two teen-age sons. Mrs. Qi came from the Beijing College of Traditional Chinese Medicine. At Berkeley, she spent

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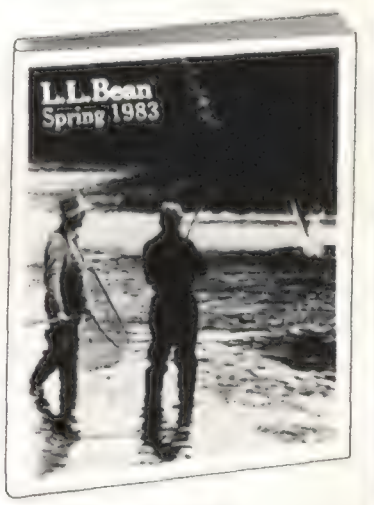

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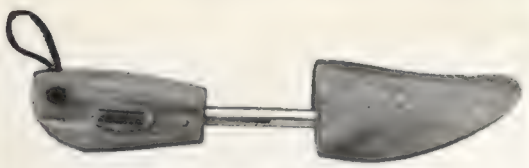

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eight hours a day in a chemistry lab. Listening to this attractive woman (her hair fluffed up almost American-style) talk about lipids and the molecular spectrum and structure seemed somehow incongruous. As with most exchange students, she was aware that the United States had more advanced equipment; she knew that, upon returning to Beijing in another eight months, she would have to adjust her teaching methods and work in the laboratory until China's modernization drive could provide her with the kinds of sophisticated tools she had become accustomed to here.

After getting her California driver's license, Mrs. Qi bought a second-hand car and, sharing expenses with three colleagues, set out to see America. They visited Yosemite and Yellowstone national parks, camping overnight and keeping a sharp eye out for campsites—free whenever possible, usually no more than $2 a night. Then they went on to New York City and Washington, D.C. At Chinese grocery stores along the way, they found supplies to cook their meals.

Some of the other scholars had a less pleasant introduction to the American scene. Xiaochung Miao, whose field was language development, had been in the States since 1980. His government first sent him to Columbia, where he shared an apartment with three other students. New York's crime rate disturbed him—after several students had been mugged and robbed of cameras, tape recorders and money, he transferred to Berkeley, where he felt more secure. But he was enthusiastic about the teaching methods at both universities, which were far more advanced than those in his own country—the use of tapes in language training has just begun there. When it came to discipline, however, he had a lot to say for the East China Normal University in Shanghai, to which he has since returned as a teacher after his two-year stay.

Many Chinese now enjoying the privilege of studying here endured dire hardships during the Cultural Revolution. This is not surprising since the aim of the revolutionaries was to destroy all vestiges of Western culture and any traces of institutions for intellectual attainment. Among the discarded vestiges were undergraduate degrees; the number of graduate students, too, was cut close to zero. Many scholars spent years doing manual labor

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in so-called "re-education camps"; others suffered brutal repression and constant harassment. For the most part these students restrained themselves when speaking about their own experiences. When I asked nearly every one about the danger of a second cultural revolution, without exception the answer was that "it could not happen again." The experience, they felt, had been too pervasive and wrenching for the whole nation.

I still have a vivid memory from the first visit my wife and I paid to China in 1973, when we were taken to visit what was called a rehabilitation center in Yenan. The rural setting in the foothills of that loess country was not unpleasant. About 40 men and women were at work; some were taking care of a piggery, but most were making adobe bricks, using a crude machine that passed the blocks in and out of a kiln. We saw at once that here were individuals of considerable distinction and education. The leader of the brick-making detail had been the chief surgeon in a hospital in the city of Xian (at least he was wearing thick gloves to protect his hands). At lunch with the director of the camp, a young-looking stalwart of a quite different type from his charges, I got into a surely futile argument. Why would not a distinguished surgeon be of more value to his country in a hospital instructing interns and resi-

Zhang Guang is probing the chemistry of oil production while at Stanford.

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dents in his skills? The unwavering answer was that when politics is in command, ideology is more important.

Back in America eight years later, I talked to another scholar, Zhang Guang (p. 36), who had worked in an oil refinery in China. Now in her third year at Stanford, Mrs. Zhang, at 38, is studying the techniques urgently needed to exploit China's still largely untapped oil wealth. Her specialty, which she has pursued for a decade, is absorption catalysis, a chemical process she regards as key to improved oil production. Her experience in the Cultural Revolution taught her a great deal about human nature; she was taken out of Beijing University and sent to the country for a long period of hard labor. At Stanford she has been fortunate to study with Michel Boudart, a distinguished chemist; this has put her on the road to her PhD, which she expects to receive in the next two years, before returning home to help unravel the mysteries of modern oil-production technology and help push China into the modern world.

It must be said that the stability of the Beijing government is the overall factor in considering whether the intercultural experiment will continue to grow or wither in a new blast of power and ideology. Deng Xiaoping, having put so many of his lieutenants in high office, seems to have won wide assent for the pragmatic approach; rigid Maoist ideology is on the wane. The infusion of brainpower, trade and ideas from the West is a major part of Deng's pragmatic program. Yet even he must suffer nightmares: Kafkaesque ghosts of Red Guards plunging China into irretrievable chaos. A decade after the Cultural Revolution ended, the ghosts still lurk.

Partly for this reason, our side of the exchange program has problems yet to be solved. American social scientists and anthropologists studying China's outback find nothing like the freedom to question and explore that they have become accustomed to in this country. Access to libraries and historical documents is complicated by excessive bureaucratic regulation and occasional paranoia. Those most active in initiating the exchange program, however, believe that, in time, these handicaps will be overcome. One of the most frustrating experiences was that of Stanford's Richard A. Ottolini. A graduate student in geophysics, he went

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to China intending to work in the field of seismic techniques related to oil exploration. Instead, he found himself completely stymied behind the eight ball of the Chinese bureaucracy that makes it difficult for foreigners to gain access to oil fields or offshore-oil exploration. The word "frustrated"' kept cropping up.

Ottolini was prepared to teach and share all he knew about advanced seismic techniques, vital to China's oil future, but, after seven months, he gave up and returned to Stanford, a puzzled, if not disenchanted, young man. His experience came, one should add, just as competition among Western and Japanese companies for contracts to tap China's offshore-oil wealth was at a feverish pitch.

In contrast, one of the more optimistic accounts comes from David N. Keightley, professor of history at Berkeley. When he first went to China in 1975, responses to his scholarly requests were polite and correct, but not overly enthusiastic. Returning in 1981 for ten weeks as an exchange scholar, he found the atmosphere entirely changed, so much so that he wrote a strongly positive report to Berkeley chancellor Ira Michael Heyman.

Keightley's familiarity with Beijing University, the joint exchange institution with the University of California, made it possible for him to order microfilm of scholarly books unobtainable in the United States for Berkeley's own East Asiatic Library. In his report he also expressed confidence that the relationship he and his other Berkeley colleagues had established with Chinese scholars would prove helpful to other Americans. In China, almost nothing gets done without the personal touch.

The value of personal ties also can be seen in the experience of Yao Wei, one of the best-known Chinese scholars in the program. His present reputation among China scholars grows out of his work with the late Edgar P. Snow and Snow's own close relationship with Mao Zedong; as a young American journalist, Snow had been the first to penetrate the blockade around Mao's forces and to give the outside world a picture of that extraordinary leader. Yao has interpreted for important foreign visitors and Deng Xiaoping and his closest deputies.

At the start of his year in the States, Yao was a fellow at the Woodrow Wilson International Center for Scholars at the Smithsonian. There he began an analytical critique of America's China policy from 1954 to 1979. Later, he went for a semester to the John F. Kennedy School of Government at Harvard, where he participated in dinners at which speakers were brought in from various ends of the political spectrum to be quizzed. As a lecturer and in frequent seminars, his quiet self-awareness and sense of humor gave him added stature.

After the stint at Harvard, he and his wife motored across the country to Stanford for a final semester. Yao recently returned to Beijing and resumed his career in the Ministry of Foreign Affairs. With a little imagination, one can easily envision a slightly older Yao playing a key role in the future of U.S.-China relations. Taking the long view, this could be just what the exchange program is all about.

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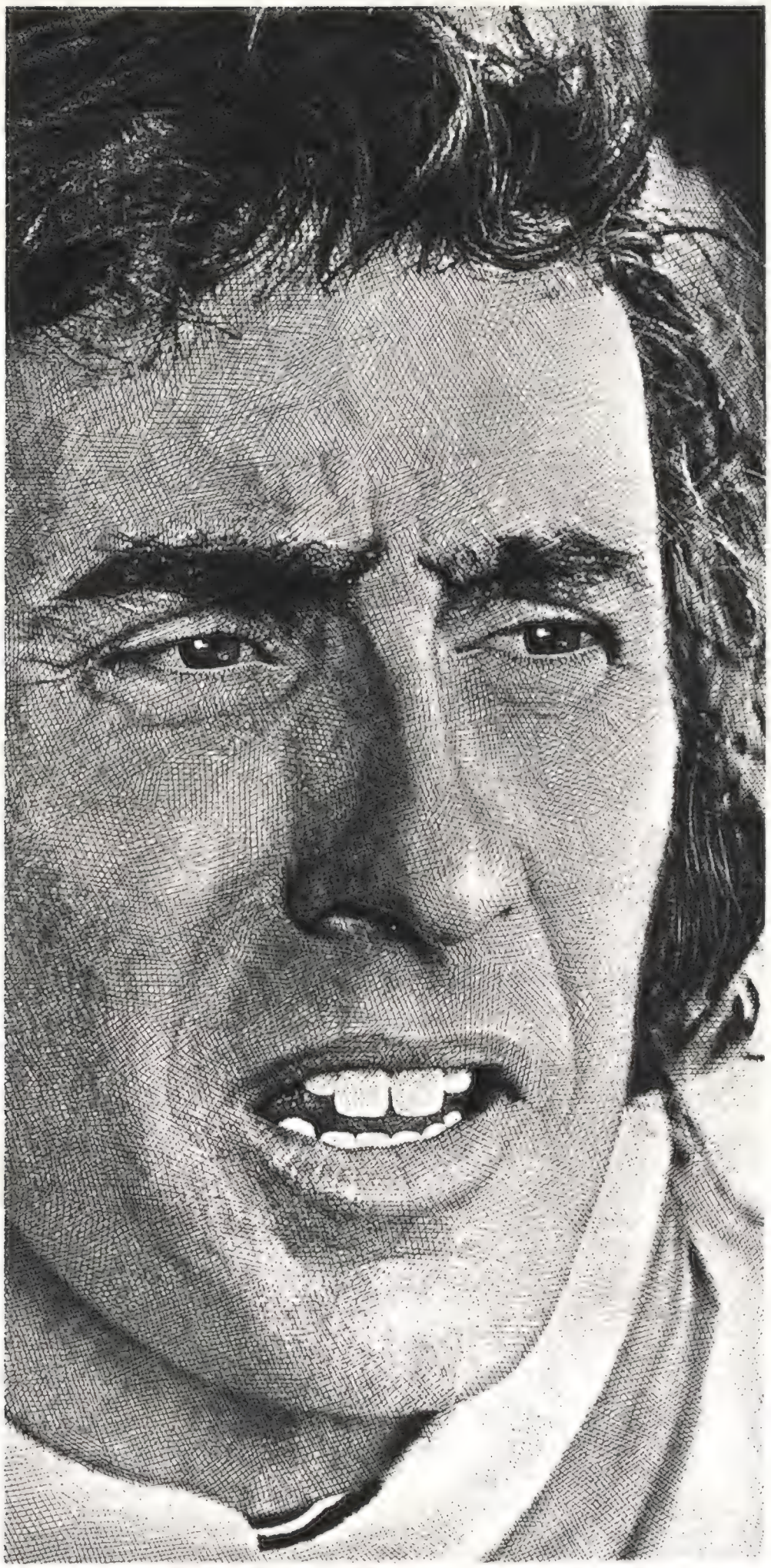

Jackie Stewart Three-time world champion driver, now consultant to Ford Motor Company.
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I've made my living over the years driving cars. Grand Prix cars, sports cars, rally cars, the most honest cars in the world.

You name it, I've driven it.

But in doing so, I've always told a builder just what I thought of his pride and joy.

Blame my skeptical nature.

That's part of it. But the rest of it is the fact that to earn my pay I had to drive the car.

And, at some point, drive it very hard.

And that's what the people at Ford have invited me to do. Drive hard, and tell them what I think...good or bad.

Apparently, they believe the unbiased opinion of a qualified outsider will help build better cars.

They want me to be an honest critic.

It's an unusual position.

But at today's Ford Motor Company, it's not business as usual.

I've seen proof of this in the 1983 Ford, Lincoln, and Mercury cars.

They're full of new ideas.

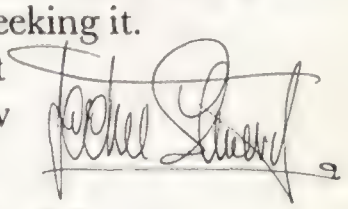
Microprocessors, electronic engine controls, space-age materials, robotic assembly, employee commitment to quality, are just a few of the things I've had to take in while learning about how things are done today at Ford.

Things have changed.

I'm convinced things have changed at Ford. And I'm glad to be part of it. Even though my part may be that of a critic.

To my way of thinking that's all to the good. Most car builders will listen to constructive criticism. But I know one company that goes even further, by actively seeking it.

Today, having a resident car critic is certainly a new way of doing business.



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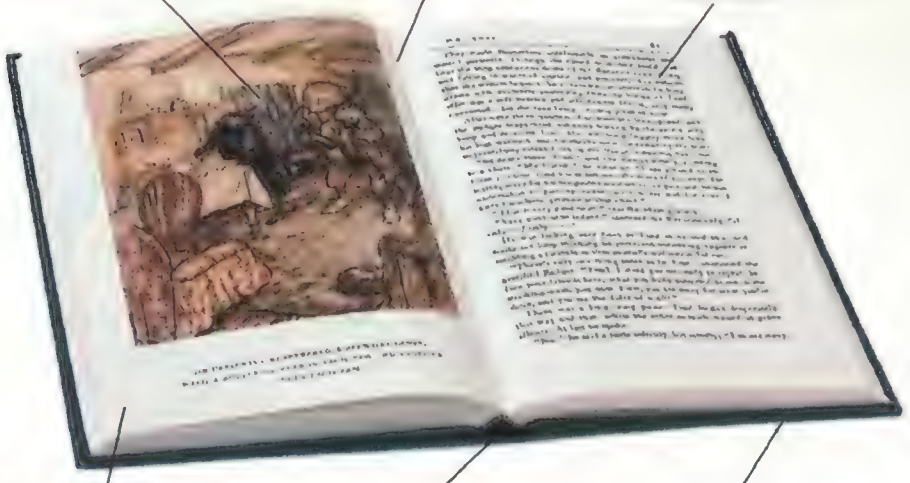

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By David Sheridan

The Colorado—an engineering wonder without enough water

A once-mighty river, now subdivided down to its last acre-foot, is taxing the ingenuity of its managers to meet increasing demands

Wheel controls gate on irrigation canal near Parker, Arizona; farmers here depend on Colorado water.

The map of Baja California was spread-eagle on the dust-caked hood and I was scowling at the solid blue line in the upper-right corner. It was labeled "Rio Colorado." Peering over my shoulder, the Pemex station man smiled indulgently. "The blue line, señor, is a mirage. The river moved . . . that way." He was pointing westward, beyond the dry wash at the end of the paved highway, toward a brownish haze. "But the road gets very rough."

I had a plan of sorts: I wanted to learn at first hand how one of our great rivers could be about to "run out of water," as people all along it seemed to be saying. I had heard stories of some very strange reclamation projects tried out along the Colorado River—tales of parachuting beavers and a waterproofed desert, to mention two—and I thought I would maunder along the river, from near its mouth on the Gulf of California (once known as the Sea of Cortés) to the headwaters area some 1,450 miles northeast in the Colorado Rockies. First, though, I had to find the river.

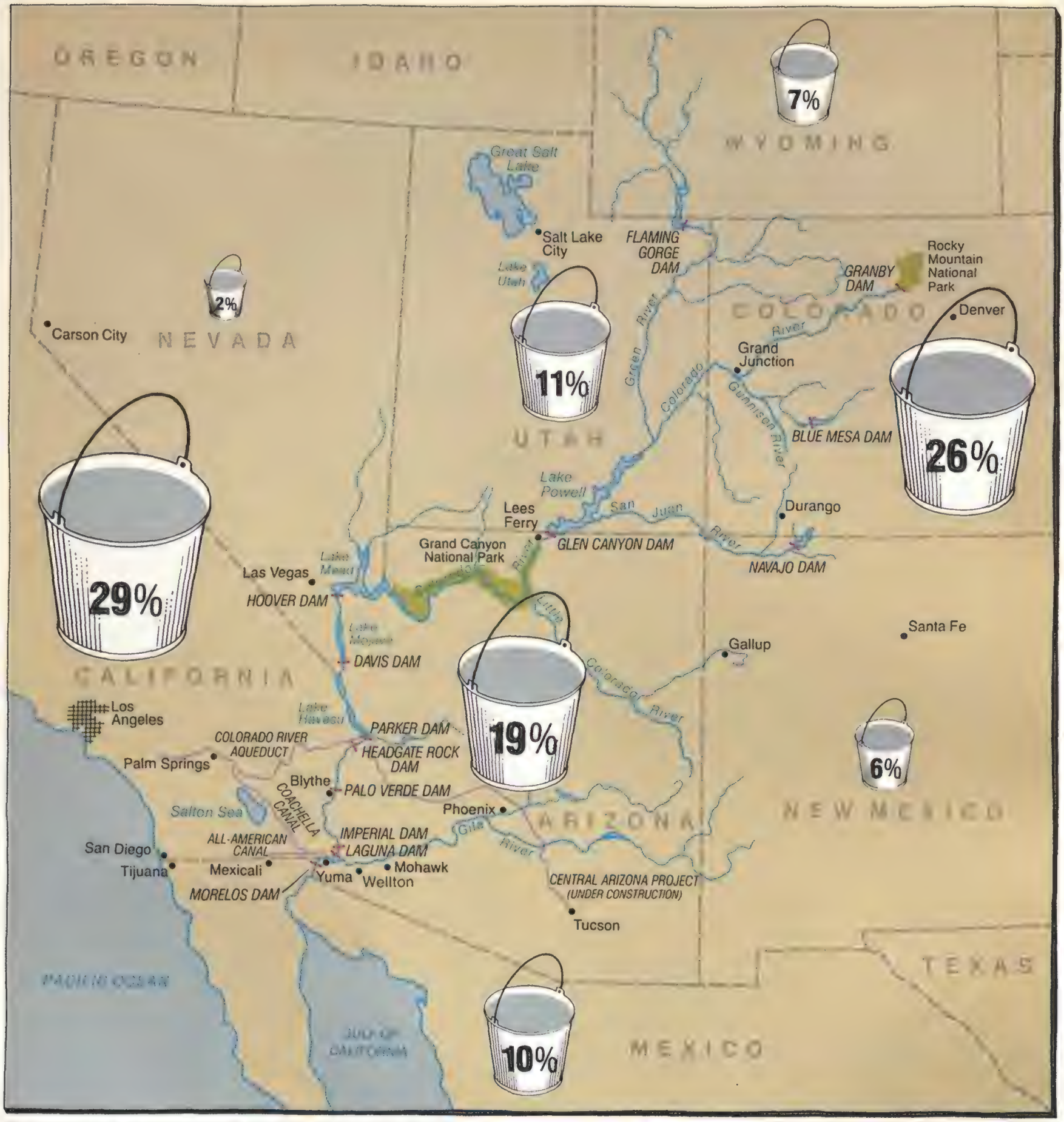
The Pemex man had been right. The road soon lapsed into a two-lane track winding through a purgatorial landscape of sinks and scrubby humps. Then, a creek came into view. It was about three yards wide and knee-deep. Could this be the mighty Colorado? The river which, as explorer-scientist John Wesley Powell said, "rolls, a mad, turbid stream into the Gulf of California"? *This* was the river that had excavated the Grand Canyon? The boys horsing around in the sluggish, cocoa-colored water assured me that, *si*, this was the Colorado.

In 1540, when Spanish explorer Hernando de Alarcón first sailed into the river's mouth, about 30 miles from where I now stood, it was red (*colorado* means red in Spanish) and it beat with such authority against the ship's bow that he wrote in his log of "a very mighty river, which ran so great fury of a storm, that we could hardly sail against it."

Today this final run of the river is really no more than a leak (opposite). The Morelos Dam at the Mexican border is supposed to divert all Colorado River water that makes it that far, but a little slips past when the river is higher than normal and heads for the sea, just like old times. Come summer, the creek below Morelos dries up. These boys were enjoying it while they could.

Morelos Dam is the last of many plugs in the river. In all, there are more than 20 in the Colorado and its tributaries. The damming begins far from here—at Shadow Mountain Dam on the Colorado at the edge of Rocky Mountain National Park and at Fontenelle Dam on the Green River in Wyoming. "The dam which tamed the Colorado," as the Hoover is known, is in the lower basin and totally controls its flow.

Colorado ends not in Gulf of California—it once did—but in this shallow creek below Mexican border.



By compacts among seven states and treaty with Mexico, the Colorado is overbooked at 110 percent, based on 16.5 million acre-feet, average annual river flow which has in fact not been realized since 1922.

Water diverted by Morelos Dam goes to irrigate the Mexicali Valley just south of the border, one of northern Mexico's most productive agricultural areas, and to supply the two booming border towns of Mexicali and Tijuana. Mexicali now has a population of some 750,000—it nearly doubled in the past decade—and Tijuana has almost a million. In reality, the Colorado now ends in Tijuana at the end of a pipe, 150 miles northwest of its natural terminus.

In 1944, the United States signed a treaty with Mexico guaranteeing that country 1.5 million acre-feet of Colorado River water a year. (Along the Colorado there is no escaping the ubiquitous acre-foot: imagine a football field covered with ten inches of water—that's one acre-foot.) But the big divvying-up of the Colorado's precious waters had occurred in 1922 under the Colorado River Compact, signed by the seven states along the river (above) and the federal government. What makes the agreement shaky—some describe it as "a house of cards"—is that it is based on an overly

optimistic estimate of the river's average flow. About 15 million acre-feet of water were originally apportioned to the states; actually, the average annual supply is only 13.8 million. In addition, the Compact did not take into account Mexico's right to any Colorado River water at all, so the 1.5 million acre-feet later guaranteed to Mexico widen the deficit between demand and supply. The Colorado is, in other words, "overbooked." One reason the house of cards has not yet collapsed is that the states in the upper-river basin, especially Colorado, have not yet used all of their apportioned shares.

A way to remedy the overbooking problem would be for the states to sit down and agree to smaller shares. This will happen, says Steve Reynolds, New Mexico's State Engineer, "when pigs fly." The states will never agree to reduce their pieces of the pie, even though the pie is smaller than they originally had thought.

Hence the great appeal to men like Reynolds of "technical fixes." If you cannot agree on how to divide a too-small pie, then try to make the pie bigger. All sorts of schemes have been put forth over the years. Some are quite grandiose, like siphoning off the Columbia River's "excess" water and sending it south by means of an underwater pipe along the Pacific Coast, or hauling huge icebergs from the Antarctic to Los Angeles. Some are quite practical—conservation measures like lining dirt canals with concrete to reduce seepage, or drip irrigation for tree crops. Others, however, are downright bizarre, like the parachuting beavers or waterproofing the desert.

At Yuma, the latest in technical fixes

An excellent place to examine the latest in Colorado River technical fixes is 55 miles east of Mexicali, at Yuma. Like so many cities in the arid Sunbelt, Yuma is growing. Orange groves and cotton fields are retreating as housing developments spread. The Department of Interior's Bureau of Reclamation is building a desalinization plant here—one of the most sophisticated of such facilities in the world, with computers controlling a reverse-osmosis process that passes salty water through a salt-trapping cellulose-acetate membrane.

The Bureau is building this plant (p.53) to alleviate a problem created as a side effect of a previous irrigation project, the Wellton-Mohawk, about 30 miles east. Water used to irrigate those fields had drained back into the Colorado with greatly increased salinity, and began ruining the fields and crops of farmers in the Mexicali Valley when they used it for irrigation. The plant will cost $350 million, twice what it took to build the largest structure on the river, Hoover Dam. The cost of desalinating the water will run $300 per acre-foot—more than three times what fresh wa-

Colorado River pumping station near Lake Havasu, Arizona, diverts water toward thirsty Los Angeles.

Irrigated by concrete-lined canal, a citrus grove east of Yuma, Arizona, thrives in the Sonoran Desert.

Dana Fisher, Palo Verde farmer, grows lettuce with Colorado water.

ter costs in Wellton-Mohawk or elsewhere nearby.

If this seems strange, consider what is happening on the South Yuma Mesa. There, along the border, the U.S. government has drilled a series of 600-foot-deep wells and equipped them with powerful electric pumps. The water they draw from beneath the ground is piped to a lift station on the border where it is raised to a conduit, sent to Mexico and credited to the United States. Meanwhile, just across the border, the Mexicans are also pumping water out of the same natural underground reservoir. This country and Mexico are like two teen-agers who have stuck their straws into the same soda and are furiously sucking away to see who gets the most before it is all gone.

From Yuma I headed north toward Blythe, California, and the Palo Verde Valley, which has one of the oldest irrigation projects on the river. This stretch of the Colorado is now as tame as an old circus lion. It has been totally controlled by the Bureau of Reclamation, and so there are no surprises. Except one: the palpable presence of the ancient peoples who once lived here because the arid climate has preserved much of their artwork. Indeed, one of the lower Colorado's best-kept secrets is its splendid outdoor display of prehistoric art.

Here I understood, for the first time, that the lower Colorado had not been "the lonely land" that government brochures claim it was. Before the dams this river had been the "Nile" to generations of Native Americans who lived along it and created a culture so vibrant it still makes your skin tingle.

Bounded on the north by the Little Maria Mountains, on the west by the Palo Verde Mesa and by the Colorado on the east and south, the Palo Verde Valley was obviously a convenient place for the river to dump its overflow, creating the wonderful disorder free-flowing rivers often will in backwater places: sloughs, hummocks, lagoons, grassy marshes, as well as dense clumps of palo verde and mesquite trees. In 1874 a government surveyor named Henry Washington drew up a map of the Palo Verde Valley on which he wrote: "Unfit for cultivation."

Within several years, though, some very determined farmers started to prove him wrong as they began draining, plowing and irrigating. Today, the valley would be unrecognizable to Mr. Washington. Its myriad irregularities have all been filled in or leveled. The only sign of its former life is the amazingly heterogeneous soil. It is not at all unusual to see a brown field with a yellowish sandy band snaking right through the middle of it. A heavier clay soil will absorb less water than a sandy one and therefore it must be irrigated less or salt will build up. This is difficult to accomplish when clay and sandy soils occur in the same field. Dana Fisher (above), one of present-day Palo Verde's most successful farmers, describes these soil eccentricities as his Number One headache. Even worse than the "damn gophers," he says. "I've spent a fortune moving the ground around, trying to make it homogeneous."

David Sheridan is a freelance writer. His most recent book, Desertification of the United States, *was published by the Council on Environmental Quality.*

Fisher grows a variety of crops on his 5,000 acres: alfalfa, cotton, wheat, tomatoes, lettuce and cantaloupes. Thanks to the long growing season and an ample supply of Colorado River water, he can measure his output in *tons* per acre—ten tons of alfalfa, 25 tons of lettuce, and so on. Lettuce from his farm may well end up in a Long Island supermarket in December, and he sees more than a little irony in this. "Think of all the energy we expend to get a head of lettuce, which is 85 percent water anyway, from the Palo Verde Valley to New York!"

Surprisingly, Fisher is not at all complacent about the future of the Colorado. I say "surprisingly" because water rights in his part of the world are determined by the appropriation doctrine—the first user to take water has first right to that water—and the Palo Verde Irrigation District is first in California on the list of Colorado River users, ahead of the much larger Imperial Valley Irrigation District to the south and the Metropolitan Water District of Southern California, which supplies the teeming Los Angeles Basin with water. Says Fisher: "If, during a long drought, the people in L.A. are hurting for lack of water, you can bet the lawyers will think up some damn reason for taking away ours."

More immediately, Fisher is worried that the Indians' demand for more Colorado River water endangers the river's "house of cards" system of allocation. "I believe strongly in equity for the Indians, but I don't think water should be the means of achieving it," he says, expressing a common viewpoint. "We should subsidize their nonagricultural economic development instead. They are planning to irrigate marginal land with the water."

Sixty miles north, there is an equally determined user of Colorado River water who quietly disagrees. Her name is Gertrude Hanks Leivas and she is a Chemehuevi (below, left). "We need more water from the river if we are ever going to be self-sufficient," she says, echoing words I heard repeatedly on the five Indian reservations along the lower Colorado. The Indians want to be able to support themselves and they see irrigated agriculture as the key. The Navajos, whose reservation sprawls across 25,000 square miles of northeastern Arizona, northwestern New Mexico and southern Utah, have state water experts throughout the basin apprehensive about potential claims.

These are based on the Winters Doctrine, the Supreme Court ruling of 1908 which, in (Colorado River expert) Philip L. Fradkin's words, "assured the Indians they could use as much water as they needed. This was later refined by the court in 1963 to mean as much water as necessary to serve all 'practicably irrigable acres' on a reservation—which could mean a vast amount of water, indeed."

The Mojave Indians, about 20 miles north of the Chemehuevi Reservation, seem to have advanced furthest toward self-sufficiency. When the Mojaves' ambitious irrigation project came under criticism in a tribal meeting because it called for clearing mesquite trees from a bottomland, trees from which the Mojaves had always gathered kindling for their traditional cremation ceremonies, the tribal chairman forced the issue. "Now is the time for us to decide once and for-

Indian tiller Gertrude Leivas says river is wasted in swimming pools.

Below Parker, Arizona, mechanical cotton picker crawls over tribal farmland irrigated by river's allocation.

A desert Venice, development near Phoenix uses scarce groundwater, increasing need to drain the Colorado.

ever," he said. "Either we sit around waiting to die so we can be cremated with the traditional wood, or we can move ahead and develop our land." They decided to move ahead.

Gertrude Leivas lives in a new ranch-style house near Lake Havasu, the reservoir created by Parker Dam on the Colorado. Like many older Indians, she has one foot in the culture that conquered the river and the other in the culture of her ancestors. I found her in the backyard, attacking the sun-baked ground with a hoe. She admits, grudgingly, that the soil is "a little flinty," but says she will soften it up enough to plant her beans, melons, squash, sweet corn and red peppers. No one who has ever met Gertrude Leivas doubts for a moment that she will prevail. Her garden, helped along by an old garden hose that flows with water pumped from the river, will flourish.

Mrs. Leivas, who takes time out to smoke a cigarette and watch the afternoon soaps, does not begrudge water to any tillers of the earth—be they white or red. What irks her, though, are the other uses non-Indians find for this precious resource. "I object to Colorado River water going to Phoenix for swimming pools, golf courses, surf-making machines and water beds," she says. "It seems like all some white people want water for is to play with."

How, you might ask, is Colorado River water going to get 140 miles east to swimming pools in the middle of Arizona? The Central Arizona Project (CAP) is how, a new $2-billion project of the federal government's (p. 52). At the lower end of Havasu there is a big pumping station which hugs the shore beneath Buckskin Mountain. Come 1985, it will begin pumping Colorado water 800 feet up through the mountain via a tunnel. On the other side, the water will empty into Granite Reef Aqueduct, part monster pipe and part concrete-lined canal, and be carried to Phoenix and Tucson as well as to the copper companies and irrigated farms of mid-Arizona. Nearly one-third of the water will go to Indian tribes in the interior of the state. There is not now enough water in central Arizona to support the city people, the copper industry and the farmers. Arizonans are using up groundwater supplies so fast that the water level in some wells is dropping ten feet a year (SMITHSONIAN will examine the problem of the nation's groundwater in a forthcoming issue). The water which will course through the CAP's canals and aqueducts is water previously allocated to California—until Arizona sued and won. In 1964, in *Arizona v. California*, the Supreme Court decreed that Arizona was entitled to some of the water which California had been taking out of the river.

The CAP has concentrated the minds of Californians who use the Colorado's water. At the Quechan Reservation, former tribal-council member George

Bryant says: "You wonder what's going to happen when Arizona sticks its big straw into the river and starts sucking." At his office on Sunset Boulevard in Los Angeles, David Kennedy thinks similar thoughts. He is assistant general manager of the Metropolitan Water District of Southern California and his utility will soon be low on the water-priority pole. He cannot say how Metropolitan will cope during the next prolonged drought, after the CAP starts pumping. Certainly it will have to cut back on its sale of interruptible water to farmers and city dwellers in this coastal-plain area between the Tehachapi Mountains and the border. If that does not suffice, more Draconian measures, such as water rationing for all consumers in the region, may be necessary.

Heading north to Hoover Dam, I stopped in Kingman, Arizona, and there I finally tracked down the waterproofed-desert story. It was true! At least in part. The Department of Interior's Bureau of Land Management (BLM) has been busy spraying paraffin or asphalt over pieces of land on the "Arizona strip," as the area between the Grand Canyon and the Utah state line is known. Each of the paraffin- or asphalt-sealed pieces is roughly an acre in size and each sheds rain like a waterproofed Burberry. The purpose is to provide livestock on this arid public land with water. Big, concrete-lined storage tanks have been constructed to catch the runoff. It is called "harvesting rainwater," but since the natural vegetation on the waterproofed land does not survive, it also could be termed "piecemeal desertification." To date, the BLM has waterproofed some 55 pieces and plans to increase the number by two per year.

Hoover Dam (pp. 52-53) straddles one of the Colorado's last major gorges, Black Canyon. Constructed during the heyday of dam building—the 1930s—it looks it. Massive. Bureau of Reclamation engineers poured concrete 24 hours a day for two straight years.

Demand for electricity rules river's flow

By comparison, Glen Canyon Dam, the other giant on the river, and built in the late '50s and early '60s, looks fragile. Behind Hoover is stored nearly a two-year supply of the river's flow. The amount of water lost through evaporation from its reservoir (Lake Mead) is equally massive—800,000 acre-feet a year. The dams, incidentally, changed the color of the river. The red sandstone silt which had given the Colorado its characteristic color was trapped behind them.

At the base of the Hoover is a power plant housing 17 generation units with a total capacity of 1.34 million kilowatts of electricity, which is transmitted to Las Vegas, Los Angeles and many other cities.

The river between Hoover and Glen Canyon dams has been totally controlled since Glen Canyon closed its gates. The river's volume and velocity are now determined primarily by the demand for electricity. If the water is running high and fast, it is because a lot of people in Phoenix and elsewhere have switched on their air conditioners. The computer in Montrose, Colorado, which keeps track of such things, signals when more water should be released from Lake Powell behind Glen Canyon in order to generate more electricity. After powering the turbines, the water rushes into the river.

Other dams were once planned for the stretch of the river bracketed by Hoover and Glen Canyon dams. A number of dams were even projected for the Grand Canyon.

At dusk on some clear spring day, sit atop one of the massive limestone elbows that jut out into the Grand Canyon along its south rim, face westward and watch

Aerial view of huge aqueduct for Central Arizona Project shows route for water Californians will not get.

Hoover Dam, the largest on the Colorado, stores two years' river flow, but 800,000 acre-feet a year evaporate.

the sun lower into this vast chasm of greens, reds, browns and golds. You will understand then, once and forever, why those dam-building plans died. The spectacle transports you back to a time before Homo sapiens, before dinosaurs or sea-soup amoebae, to a time when there were nothing but raw forces at work, relentlessly sculpting the Earth.

When the proposals to fund the dam projects in the Canyon reached Congress in the late 1960s, there was a groundswell of public protest. Indeed, dam builders to this day have yet to recapture the public confidence and backing they enjoyed *before* trying to put dams in the Grand Canyon. For them, it was something of a grave.

The political boundary between the upper and lower basins of the Colorado is the Arizona-Utah state line. Just below it, and Glen Canyon Dam, is a place called Lees Ferry. Some abandoned stone cabins here once sheltered U.S. Geological Survey scientists who studied the river's flow back when it was a natural phenomenon. Today a tall concrete structure at river's edge contains the instruments that monitor the Colorado's vital signs; atop it is an antenna for transmitting the data to a satellite, which beams to computers at the USGS's headquarters in Reston, Virginia. It is above Lees Ferry that the upper-basin states—Utah, Wyoming, New Mexico and Colorado—are supposed to deliver an average of 7.5 million acre-feet of water a year to the lower basin states—Arizona, Nevada and California—under the terms of the Compact of 1922.

I met Elmer and Wilda Schultz at Lees Ferry. They live there in a snazzy silver trailer. When they feel like moving, they hitch it to their Buick and take off. They are part of a new tribe out West called "snowbirds" by the local people; they migrate with the seasons—southward in winter, northward in summer. The Schultzes are veteran snowbirds and have heard the story of the parachuting beavers. They *think* it was in Colorado.

I was heading for Colorado anyway, to ask about one of the federal government's most ambitious technical efforts to increase the Colorado River system's

supply: cloud seeding. Scientists have found that if you seed clouds on the windward side of mountains with silver iodide or dry ice, more snow will fall as they pass over. Or at least scientists think they have found that to be true—it is tough to prove because it is hard to predict how much snow would have fallen without benefit of silver iodide. Bureau of Reclamation officials are quite confident that cloud seeding could increase the water supply in the basin by more than one million acre-feet per year.

Vegetation modification is another major technical fix being tested here by the government; it involves cutting mountain forests into quiltlike patterns. This, say scientists, can increase the snowpack and runoff in the open areas, with minimal increase in soil erosion. Experiments in the Food Creek watershed of Fraser Experimental Forest in north-central Colorado showed that such cutting increased water yield by about 40 percent on an annual average.

But hydrologist Charles Troendle of the U.S. Forest Service cautions that this is no "quick fix" to the water problems of the Colorado Basin. "You must have storage facilities available to capture the increased runoff for it to do any good," he says, "and the increases in runoff are much lower during drought years when you need the extra water the most."

The last major drought in the West occurred in 1976-77. Clues to the long-term solution to the Colorado River Basin's and, indeed, the whole arid West's water problem can be uncovered by looking at how some communities, which were short of water but long on imagination, coped with that drought. Take, for example, San Rafael in Marin County, California, about 25 miles north of San Francisco. Nearly 80 percent of the buildings in this county of 250,000 were refitted with water fixtures that conserved water better, especially those that required less water pressure such as low-flush toilets. Hot-water pipes were insulated, because that reduces both water and energy consumption. In the city itself, landscape plans for large new open areas were altered, replacing vegetation that demands much watering with more water-efficient arid-land plants. The city reduced its water use by 37 percent. Other measures such as pumping water from drainage ditches to supplement irrigation of traffic islands helped save some $2 million in landscaping while cutting water use. In addition, the cost of a new connection to the water system was adjusted proportionally to the anticipated volume of water use. The higher the planned use, the greater the charge. Increased revenue that resulted was earmarked for construction of additional reservoir facilities.

In other words, the best way to cope with water scarcity is to make sure that the best water-conserving technologies available are actually in use, and that water consumers themselves pay for the measures taken to increase their water supply. Such an approach, however, means a complete flip-flop in basic

Desalinization plant under construction west of Yuma will recycle river water used for irrigating crops.

water-management concepts. Up until now, society at large has borne most of the initial costs of increasing the supply in water-short areas, but it has done almost nothing to encourage the use of the most efficient water-consuming technologies.

The recent drought also has stimulated research into a heretofore neglected area—water conservation in irrigated agriculture. Necessity still is the mother of invention, so the Israelis are far ahead of us when it comes to squeezing the most out of every drop of water for cultivating crops.

But several advances have been made by Americans in recent years. Many high-pressure, center-pivot irrigation systems that shoot water skyward have been replaced by lower-pressure ones that spray downwards. Some farmers now use a laser device, which acts like a horizontal plumb line, to gauge the flatness of their fields—the flatter the field, the less water is wasted. Perhaps the next big technical step will be to take waste agricultural water and reuse it, either for certain industrial and municipal purposes or in the production of salt-tolerant plants and saline algae for bioenergy and chemicals, and then reuse the water again in solar ponds for the generation of electricity. Clearly, we have only just begun to apply our native ingenuity to the job of using increasingly scarce water with maximum efficiency.

Perhaps the parachuting beavers were an example of ingenuity, but they were proving elusive. The story was every bit as good as the waterproofed desert, perhaps even better. The government, I had been told, had parachuted beavers into a watershed which had inadequate man-made, water-storage facilities, the idea being that the beavers would build their dams and thereby keep some of the spring floodwater from escaping. How, you might ask, did the beavers get out of their parachute harnesses? This was clever. The parachutes, or so the story goes, were not attached to the beavers; they were fastened to the padded cages which held the beavers as they dropped from the sky; after they hit the ground, remote-controlled doors on the cages were opened by a radio signal from the airplane above.

In a last effort to pick up their trail, I checked with different government agencies back in Denver and then in Washington, D.C., and was finally put in touch with BLM biologist Bruce Smith of Rock Springs, Wyoming. Yes, he had transplanted beavers into the beaverless Currant Creek area in the upper Colorado basin, but no, their mode of transport had been less exotic—he had done it by pickup truck.

I filed the parachuting-beavers story under "Colorado River folklore and legends," and trekked to the headwaters area of the river itself. The Colorado comes to life each spring in a snowy amphitheater beneath Thunder Mountain, nestled among the Never Summer Mountains in Rocky Mountain National Park but, when I arrived, it was still too early for tourists. The only way in was on snowshoes. The going was very quiet, soothing and slow. There was plenty of evidence of beavers. In fact, it looked as though the snowmelt's early downrush had wrecked a dam they built across the Colorado. No sign of parachutes. So I helped myself to the river. The Colorado was icy and incredibly delicious—an elixir left behind by the ancient river gods who have been routed, at least for now.

Near headwaters in Rocky Mountain National Park, Colorado's North Fork begins its 1,450-mile meander.

After tranquility at Lava Falls Rapids on south rim of Grand Canyon, river runs a technological gauntlet.

By Robert Wernick

From ewe's milk and a bit of mold: a fromage fit for a Charlemagne

Penicillium *spores, plus a special formula that dates back at least to Roman times, keep the town of Roquefort rich and redolent*

Roquefort-sur-Soulzon nestles in a limestone landscape noted for cool caves that are used in making cheese.

It is one of the oldest protected product names in the world. The Parlement of Toulouse, the high court for southwestern France, decreed in 1666 that anyone presuming to sell a cheese described as Roquefort, which was not made in the town of Roquefort-sur-Soulzon according to the traditional methods of the trade, would be subject to a fine of a thousand livres. The laws are strict to this day. Any cheese labeled Roquefort must come from one of the 13 producers whose *caves* are buried in the cliffside near the streets of the ancient town. The Roquefort dressing you get on your salad must contain, if your restaurant is honest, 15 percent of genuine cheese from these *caves*.

There is nothing arbitrary about this. Roquefort is indeed a unique product. Anyone can make a cheese with holes in it and call it Swiss. Anyone can mix mold with curdling milk and produce a cheese that he can call "blue"—though blue is a misnomer, the fault, perhaps, of some color-blind medieval monk. The color is actually blue-green. But Roquefort is not to be confused with ordinary blue cheese. For one thing, it

During first stage of ripening, rows of Roqueforts spend four weeks in a vault deep underground.

Photographs by Philippe Lafond

René Delon-Castelet, Société des Caves et Producteurs Réunis, Roquefort

Mold spores (magnified 450 times) multiply in half-matured cheese.

Cultivated first in bread, mold is then ground up and injected into the cheese, to give flavor and color.

is made with ewe's milk, not cow's, and hence has a juicier texture. For another it is made under ideal conditions in a refrigerating and humidifying plant that would cost a fortune to duplicate, but is provided in Roquefort-sur-Soulzon gratis by Mother Nature.

Several million years ago, accompanied by a series of thunderous roars, a huge chunk of the nearby *causse*, or limestone plateau, collapsed into the valley of the Soulzon, forming a jumble of blocks about a mile and a quarter long, more than 300 yards deep, piled up at all angles to one another like so many broken sugar cubes. There are spaces between these blocks, sometimes cracks as thin as a fingernail, sometimes corridors down which you could climb for a considerable distance, sometimes pits deep enough to drop your worst enemy down with no fear that he would ever come back to haunt you.

These cracks and pits and corridors are known in the local dialect as *fleurines* (from a verb meaning "to blow") because of the cool airs that blow out of them. The inhabitants of the region have been aware of these winds ever since Neolithic shepherds, four to six thousand years ago, drove their flocks up from the plains of the Mediterranean coast to the upland meadows of the *causse* country. The land was, and is, rough, desolate, wind-blasted. It will grow grain or grape only with reluctance. But it proved to be good sheep country, and the wanderers eventually settled down there. They probably prospered, at least if one may judge from the quantity of huge menhirs and dolmens they erected near their sheep trails.

The shepherds who came to the valley of the Soulzon discovered the network of caves and fissures on the surface of the rockslide, and could only have been intrigued by the breeze that rose steadily from them each summertime, offering refuge from the sun and the flies, as well as a good place to store their mutton and their bread and the cheese they had apparently learned to make by putting rennet (the stomach lining of unweaned lambs) into pots of ewe's milk.

This cooling air flow, as later investigation would show, was the effect of an intricate wind system arising within the interlocking *fleurines* in the jumble of limestone blocks. The openings, facing north, are rarely touched by the sun. The winds bring rain that seeps down into a network of underground streams. Some of it, also, is retained by cavities in the porous rock. In winter, cold damp air sinks down. In summer, the rocks exhale their moisture and cold damp air flows upward. What this all adds up to is a self-regulatory system, as precise as any computer could devise, which helps the temperature in the *caves* to remain constantly between 44 and 48 degrees F. The relative humidity varies only a point or two from 95 percent.

Hardly an inviting environment. The tourist who visits the *caves* where the cheese is made today and sticks his nose into one of the *fleurines* may well think that the strong cold blast—strong enough to put out a candle—comes, like the wind in the ballad of Frankie and Johnnie, from the southeast corner of Hell. No

Robert Wernick wrote about goats in the December 1982 issue. A frequent contributor to SMITHSONIAN, *he spends part of each year in both Georgia and Paris.*

animals choose to live here, though rats and sometimes dormice come down, lured by the smell of cheese. The *fleurines* are not quite lifeless, however. They provide a breeding ground for a tiny mold, *Penicillium roqueforti*, so called because this was the spot where the mold was first identified and where it flourishes most happily. For this little fungus, which is the secret of the taste of the cheese, by happy coincidence lives best in a moist habitat where the temperature generally hovers around 50 degrees F.

You can see little colonies of *Penicillium* glistening against the dark rock on any *fleurine* or any man-made wall inside the rockslide. Give it something to feed on, say a piece of bread, and it reproduces itself at a fantastic rate. Under a microscope you can see its little fingers putting out reproductive spores—a strong microscope because these spores are so tiny that it takes hundreds of millions of them to fill a soup spoon.

The discovery of *Penicillium roqueforti* (which is only a distant relative of the mold that produces the antibiotic) may have been made in Neolithic days. One story favored by the local authorities is that a shepherd boy was one day loafing in a cool dark cave, about to eat a rustic lunch of bread and cheese, when he saw a shepherdess go by with her flock. Dropping his lunch, he raced out after her. What with one thing and another, it was several days before he returned. To his amazement he found that the bread was a mass of green mold and his cheese was all streaked and mottled. Wisely he left the bread alone but ate the cheese. Finding it delicious he called in his friends, and soon every cave along the hillside had a cheese and a loaf of bread in it.

Oldtime shepherd and cat check some of 800,000 ewes needed to supply local cheese makers with milk.

Subterranean passages, or *fleurines*, bring air to *caves*, miraculously keep the heat and humidity constant.

The Visigoths wanted some, too

Albert Alric, who produces about six percent of the cheese in Roquefort, says this pretty tale is romantic nonsense, and he has a more down-to-earth explanation. Despite his aristocratic name—which, by his perhaps lax genealogical standards, indicates that he is a lineal descendant of Alaric, the fifth-century king of the Visigoths and conqueror of Rome—Albert Alric is of peasant stock. He was brought up in a countryside where daily life had not changed much since Neolithic times. His grandmother used to go out to pasture with the sheep every day carrying a long leather whip to chase off wolves.

In Neolithic times, according to Alric, as in the days of his youth, all hands were needed in the field in summer, and bread could not be baked more than once every six weeks or so. If it is kept in cool hillside caves, bread tends to get moldy after six weeks. But in a peasant community, it is sacrilege to throw out bread, so the peasants went on doggedly eating it any-

way until someone noticed that the stale slices tasted better with cheese on them. And a day came when one of those unknown geniuses who open up new pathways for mankind reasoned that instead of taking the cheese to the mold he could take the mold to the cheese. He mixed some moldy bread into the milk as it was coagulating. The result was something that not only tasted better but lasted longer than ordinary cheese.

The news of this discovery spread over the trade routes of old Europe. When the Romans built the great highway, the Via Domitia that helped link the Pyrenees with Italy, it passed not far from Roquefort, and it became relatively easy to send the cheeses to the seacoast and then by coastal shipping to Rome. The Romans, it seems, fell in love with Roquefort. Like all the Mediterranean peoples down to our own time they were used to cheeses, a number of which tended to be dry and hard. Roquefort, by contrast, was smooth and soft and tasty, and the Roman aristocrats were willing to pay high prices to have it on their tables. So, no doubt, were the Visigoths who succeeded them, and then the Franks. The Emperor Charlemagne, it is said, used to have a packtrain of mules bring Roquefort to his court at Aix-la-Chapelle every Christmas. Rich, landed proprietors like the Knights Templars, who were once in charge of the area near Roquefort, received payments in cheese from local peasants.

As demand increased, the natural caves that opened into the rockslide were gradually widened and deepened. Others were dug. On and in front of them grew up the town of Roquefort, a single narrow street hugging the side of the cliff. Early on, there was a swarm of small producers. But in 1842 most of them got together to form the Société Anonyme des Caves et des Producteurs Réunis de Roquefort, known to everyone in the region simply as La Société. It is now a private and very powerful company that controls about 80 percent of the cheese production, as well as the only hotel and just about everything else of value in town. The Société's main *cave* is a six-story underground cathedral carved out of the naked rock. A visit through its dark, dank halls (be sure to take a blanket), thronged with the ghostly shapes of thousands of maturing cheeses, is a major tourist attraction.

Robert Aussibal, a great voluble bear of a man who directs this *cave*, likes to emphasize the continuity of tradition at Roquefort. "We have electricity and sanitation and hygrometers and all that," he says, "but the process of manufacturing the cheese is basically the same as it was in the days of the prehistoric shepherds." Indeed, as he loves to point out, life in the whole region is full of reminders of the distant past. Hunters

Before being poured into forms, milk is strained through mesh to remove impurities, warmed to 86 F.

In the draining room, where young cheeses are dried, a worker places an identifying mark on each.

Salting teams hold the wheels of cheese on the side, in order to rub a "small handful" of salt on them.

Special cheese-master's tool extracts a sample that shows whether the mold has been spreading properly.

who go out among the megaliths to hunt thrushes still make a deadfall out of a flat stone leaning on two sticks. The unsuspecting bird reaches in with its beak to get some juniper berries, disturbs the sticks, and down comes the stone.

The ewe that provides the rich milk for Roquefort cheese comes of a race originally bred in Neolithic times. It is a remarkably silly-looking sheep with a little flat head, narrow shoulders, a shabby coat of wool. But it has huge udders that can produce 35 gallons of milk a season, up to 110 in prize specimens, and it is quite robust, resistant to the harsh climate. Officials say that it takes something like 800,000 ewes to keep the Roquefort industry going. Some shepherds will tell you that the shallowness of the *causse* soil—you can strike solid limestone about four inches down—adds a special richness to the taste of the milk, by limiting the animals' diet to delicate grass.

The *Penicillium* which makes the cheese possible is grown the way it was in prehistoric times, by putting bread in a *fleurine*. Albert Alric, a traditionalist who says he follows the ancient ritual to the letter, will be glad to show you row on row of his bread slowly molding away on shelves in his *cave*. The shelves, like everything else in the *caves* not stainless steel or solid rock, are made of oak, one of the few woods that can resist the pervasive dampness. Even oak rots in the end. The Société has to change its shelves every 50 years. Alric likes to claim, however, that *his* shelves, made of oak cut in the full of the moon with a north wind blowing, are still solid after 140 years of service.

The stacked loaves are big, weighing close to 20 pounds, and are baked at very high temperatures over wood fires, of pure flour of rye—or rye and wheat. As a result, they have a thick, burnt crust that keeps the inside moist. Loaves are rotated 45 degrees every week, and after ten weeks you can pick off the crust of the bread and find inside a powdery green mass of *Penicillium* spores. This will eventually yield one pound of purified spores. The slightest stir of air will send a thin green cloud dancing around the room.

These spores are collected, dried, pounded, strained through a mesh of stainless fibers so tightly woven that you cannot see the sun through them, and then they are ready for the cheese. About a quarter to a half pound of spores will service two tons of milk.

The servicing is done at dairies scattered throughout the sheep-growing region, where milk is delivered from the farms every day. The milk is strained through cotton mesh to keep out impurities, and gently heated to a temperature of 86 degrees F. Then rennet is added, and the milk curdles in about two hours. Drained of excess liquid, it is poured into molds which form it into flattened cylinders about four inches by eight across. As it is poured, a minute quantity of *Penicillium* is mixed in "by hand," Albert Alric insists, darkly hinting that some of his competitors use vacuum cleaners for this delicate work.

From the dairies the cheeses, now called *pains* (breads), are brought by truck to Roquefort, to start the process known as *affinage*. They spend a week being salted on all sides. Then they are brushed clean. Then they go through a machine that pierces them from end to end with 30-odd fine needles. The holes thus created let damp air flow into the cheese, and let carbon dioxide released by the fermenting process escape. Thus stimulated, the *Penicillium* spores go to work with a will. The *pains* are placed vertically on oaken shelves, with enough space between them to let air circulate, and soon greenish veins begin to travel through the white mass. The natural air-conditioning system of the *fleurines* here shows its worth. If the temperature were lower, there would be no changes in the body of the cheese, and its taste would not develop.

How a town turns mold into gold

If the temperature were higher, changes would come too rapidly, harmful bacteria would breed and the taste would be ruined. If there were less humidity, the cheese would turn dry and flaky. If there were more, it would be unpleasantly soft and mushy. In this perfect equilibrium, the veins push on.

They must not be allowed to push too far, however, or they will spoil the cheese. To slow down the molding process, after about four weeks on the shelves each cheese is taken down and wrapped in leaves of pure tin, carefully fitted by deft hands to every tiny crack or ridge in its surface. Thus little air is directly in contact with the cheese when it goes off to cold-storage rooms at about 35 degrees F to rest in the dark while the spores in the veins languidly work their intricate way into the cheese, giving it the mottled look so prized by its admirers. This process goes on for a minimum of 90 days, until the cheese master decides a particular *pain* is ripe. He has a thin, hollow probe with which he can scoop out minute quantities from the interior and see how it is doing.

How many a day? I asked one of the cheese masters in a *cave* of the Société.

"Oh, about seven thousand," he replied. "Don't be alarmed," he added hastily, "I don't taste them all. My liver would have burst years ago. I only actually taste them when there is a special order for some special occasion, like a state dinner where the President of the Republic is receiving the Queen of the Netherlands." After 25 years in the business, he said, his eyes and nose can tell him all he needs to know. Has the proper ivory tone been achieved? Is the *persillage* (the mold) properly green? Has it spread properly through the cheese? Is the texture right? "Usually I don't need to taste it," he said, "to know when the taste is right—sharp but not aggressive."

Some cheeses will always be sent back to the cold to await their turn so that there will be an adequate supply, even in months when there is no milk because the ewes are breeding or feeding their lambs. When ready, cheeses are brought back to workrooms at normal *cave* temperature. The tinfoil is removed and recycled. Workers with knives exactly as long as the cheese is tall scrape away any crust that may have formed through the presence of illicit air under the tin. The cheeses, now weighing about six pounds, are wrapped in foil and stamped with the official seal of the Red Sheep, which is a guarantee that they are an authentic product, made in Roquefort. And thus they go out into the world, five and a half million of them every year. That is 16,000 tons of Roquefort, much of it eaten in France. Only about 700 tons a year are shipped to the United States.

Before being put away to mature for market, cheeses, weighing six pounds, are hand-wrapped in foil.

Telephones kept in glass boxes

Roquefort people are proud of their cheese and proud of their way of life, even of their damp cold underground workplace. Yes, it is so damp that telephones have to be kept in glass boxes with electric lights burning to keep the wires dry. But the workers have found that, with wooden shoes and plenty of woolen clothing, they suffer less from rheumatism and such ailments than their cousins on the farm.

They are all experts on how to eat Roquefort. The only proper way, they say, is to spread it on a thick slice of country bread and wash it down with a full-bodied red wine. If you have to use it in cooking, do so only in simple dishes like an omelet. "If you keep Roquefort a long time on the stove," says plainspoken

Yves Emile Combes, who runs the smallest *cave* in town, "it starts to stink."

Roquefort will always cost more than other cheeses, if only because it is more expensive to milk 30 ewes than one cow in order to get an equivalent amount of milk. But Roquefort folk insist their cheese is really an economical buy. Unlike Camembert, or Pont l'Evêque, say, there is little waste, and no crust. Besides, the cheese itself is so rich and satisfying—ewe's milk being twice as rich in butterfat as cow's—that you don't need to eat so much of it.

The cheese should be stored in the lower, moister part of the refrigerator and taken out only a couple of hours before eating. It should then be in a state of tart, nutty creaminess.

The taste should be a sufficient recommendation for eating Roquefort, but some people have found that it can stimulate them to poetry and to passion. The famous French gastronome who called himself Curnonsky said, "The genius of Roquefort is the son of the mountain and of the wind." Albert Alric himself has written a 60-line *Hymne au Papillon* (Papillon, or butterfly, is the name of his cheese) in Alexandrine verse celebrating the "divine sublime, prestigious nectar" he produces. Casanova, the wicked Casanova, assures us on the basis of a particularly sensuous dinner that a mixture of Roquefort cheese and Chambertin wine is "an excellent thing to restore an old love and to ripen a young one."

Don't count on Casanova, though. The Roquefort eaten today is not necessarily the same as it was in his day. For all its devotion to tradition, in some ways Roquefort likes to keep up with the times, and the universal spread of refrigerators has made it possible to send out cheeses that are softer and more unctuous than anyone would have dared to put on the market in the past. Jean Rouquet, technical director of the Société, remembers that in his youth, in the country nearby, the cheese was so dry and strong that they used to keep it in a drawer in the kitchen table for weeks at a time. If you did that with today's product, he says, the Roquefort would run away. The taste, he is sure, has improved; whatever its effect on lovemaking, anyone sitting down to a plate of Roquefort today with that bottle of Chambertin can be confident he is eating better than Charlemagne ever did.

A king's ransom, Roqueforts "sleep" for months in a cool curing vault. Cheeses retail for about $50 apiece.

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In this multiple exposure, the 240-pound bob of the Foucault pendulum at National Museum of American History is seen knocking down a circle of pins. Arc described by the pendulum appears to rotate,

By Alan Linn

Oh, what a spin we're in, thanks to the Coriolis effect

We do not feel the Earth moving beneath us, but we see the results in ocean currents, weather systems and in the flight of missiles

but actually Earth is turning underneath it. Arrows show how the circle has turned beneath the pendulum.

A pig's tail, to some people, is a microcosm in which they can discern inexorable laws governing the universe. These people, who include more than a few Midwestern hog farmers, say that if you compare the tails of porkers from all over the world, you will see that tails north of the equator curve to the right (as seen from the snout end), while those in the Southern Hemisphere curve to the left. They will tell you that water running down a bathtub drain will form counterclockwise whirlpools in the Northern Hemisphere and clockwise in the Southern.

Such beliefs turn out to have little or no basis in fact, and yet the "force" implicitly invoked affects everything from ocean currents and weather patterns to the trajectory of a ballistic missile. Physicists can show that an object moving freely over the surface of the Earth tends to curve to the right in the Northern Hemisphere and to the left in the Southern. If pigs could fly, they would do the same. No actual force is involved; what happens is better understood as an effect, an effect of the Earth's rotation.

The phenomenon has been recognized by physicists and philosophers for centuries. It was little understood, however, until an inquisitive assistant professor of analysis and mechanics at the Ecole Polytechnique in Paris quantified the natural law involved in 1835. The man's name was Gaspard Gustave de Coriolis and his main preoccupation in life was the dynamics of moving objects. He was the first to use the words "work" and "kinetic energy" in their modern scientific sense and he once wrote a treatise on the mathematical principles in billiards. We have no record of the professor using this knowledge to hustle his colleagues in local poolrooms.

Legends of apples and billiard tables

Sir Isaac Newton, the "discoverer" of gravity, it is said, was inspired by falling apples. In the case of Coriolis, it may have been billiards that provided the inspiration: he realized that any object moving over the surface of a rotating body, be the body billiard table or planet, would appear to be deflected from its appointed path.

In 1835 Professor Coriolis submitted a paper to the Polytechnique's journal entitled "On the Equations of Relative Motion of Systems of Bodies." In it he demonstrated that on a rotating surface an imaginary force appears to act at right angles to the direction of any moving body. As the Earth we live on is a rotating body, the implications are profound.

For example, if you fired a rifle at a target 400 feet away, the bullet would curve to the right by about a tenth of an inch. This assumes you are firing in the middle latitudes of the Northern Hemisphere on a windless day. You cannot blame your poor aim on such a small deflection, but it can give artillerymen fits.

In World War I, German gunners manning the "Big Bertha" shelled Paris, 76 miles away. At that range and at the velocity at which the shells traveled, the Coriolis effect would have deflected them about a mile to the right. The huge gun was so inaccurate, however, that it was merely aimed in the general direction of Paris and the gunners did not bother to correct for Coriolis drift. The greater the distance, the larger the effect. A missile (without its own guidance system) aimed at Eureka, California, from the North Pole would fall into the ocean about 100 miles to the west.

Illustrations by Jan Adkins

The dizzying Coriolis effect

On Earth, the curve of such moving objects is unmistakable, but if you watched the projectiles from a space station, they would appear to travel in an absolutely straight line. The explanation of this paradox strikes at the heart of the Coriolis phenomenon: the curve results from a rotating frame of reference. It is an effect, not a force.

To understand the Coriolis effect, you should reproduce it. It is easily done with almost any rotating surface, such as a phonograph turntable. Put a piece of paper on the turntable and, as it turns, draw a line from the center to the edge. If you are trembling with the excitement of scientific discovery, use a ruler resting on the center post as a guide. To your fixed frame of reference you will see that the pencil moves in a straight line. However, if you were a bug on the paper, you would see the pencil move in a curve and, wonder of wonders, the drawn line indeed curves.

If you are brave enough to risk a certain amount of derision, you can see the Coriolis effect even more vividly on a merry-go-round. Throw a ball at a companion riding with you. He need not worry about being hit. The ball will curve mysteriously from its target. If the merry-go-round is turning counterclockwise, as is the Northern Hemisphere, the ball will curve to the right. Stand on the ground beside the merry-go-round and watch two riders play catch. You will see that the ball travels in a straight line—and you will wonder why the pitcher cannot connect with the catcher.

To a rider the ball appears to curve, because, during its flight, the merry-go-round rotates beneath it. Similarly, during your rifle bullet's half-second flight, the target moved a tenth of an inch counterclockwise. In 1918, the Big Bertha shells were in transit for three minutes, time enough for Paris to move about a mile.

Just like the inside and outside horses on a merry-go-round, different places on the Earth's surface move at different speeds as the whole thing rotates. On a phonograph turntable rotating around its post at 33⅓ revolutions per minute, it is easy to see that the outside of the turntable is moving faster than the inside, even though every part of the turntable is making 33⅓ rpm. The outside travels a greater distance, so it moves faster.

Now imagine that the turntable is rubber and we can pull the center portion up the post until the once-flat turntable becomes a perfect half sphere, now rotating counterclockwise as a model of the Northern Hemisphere of the Earth. Exactly the same conditions obtain. The edge of the turntable is still farthest from the post (now called the axis of rotation) and travels fastest. Moving up toward the post, we find points on the turntable moving slower and slower as their distance from the axis decreases until finally, at the post itself, the motion is slowest of all.

The legend that pigs' tails curl one way in Northern Hemisphere, the reverse in Southern, is not true.

Quito moves faster than New York

On the real Earth, Quito, Ecuador, is moving east at roughly 1,000 miles per hour. It has to. Take the circumference of the Earth at the city's latitude and divide by 24 (for the number of hours in a day) to calculate the speed of the city's motion. New York City moves east at only 750 miles per hour. It is closer to the Earth's axis and travels a shorter distance in 24 hours. The farther north you move, the closer you are to the Earth's axis and therefore the slower you move.

Anywhere that you may be in the Northern Hemisphere, everything south of you is moving faster than you are and everything north is moving slower. This is just as true of the room you are sitting in as it is of continents. The south wall of your room is infinitesimally farther from the Earth's axis and therefore moves infinitesimally faster than the north wall.

Yet neither your room nor the continent breaks apart. They are constantly turning or "twisting" in exact compensation for the differences in velocities. Imagine two runners side by side, somehow rigidly harnessed to one another, and imagine that the runner on the right is just slightly faster. They will continually turn to the left in order to remain side by side.

Consider a globe on which you can see people standing. A person in New York stands facing due north. Another person in Madrid does the same. They are turned slightly toward one another. As the Earth rotates, the person in New York will soon be in the spot the person in Madrid was when we started. And now this person (still facing due north) will have turned or twisted to the left to take up the exact position of our original madrileño.

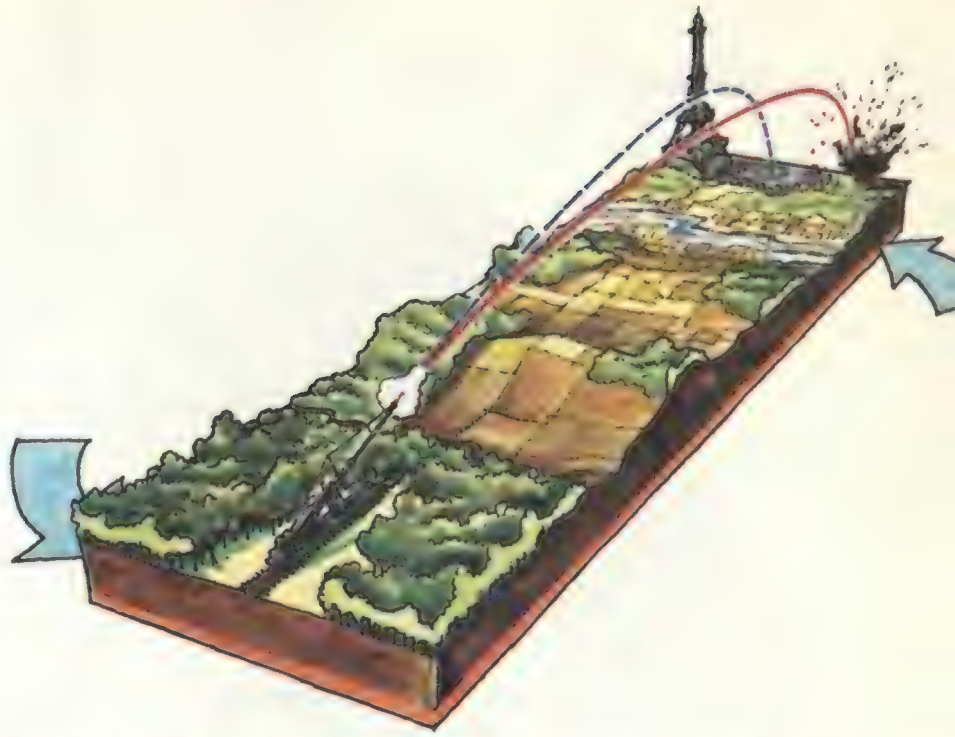
In the Northern Hemisphere, the Earth beneath us twists to the left all the time, very slowly near the equator but faster and faster with increasing latitude. Anything moving across that twisting surface, whether bullet or ocean current, will appear to stray to the right. But it is only appearance: the bullet flies in a straight line while the target moves to the left.

A growing suspicion about the Earth

Our prehistoric forebears may have suspected that the Earth provided what today would be called a moving frame of reference with respect to the stars. Anyone watching the sky on a clear night will see that the stars curve in their flight across the heavens. About 270 B.C. Aristarchus, a Greek astronomer on the Aegean island of Samos, became probably the first to suggest that the Earth moves in an orbit around the sun. Copernicus refined the idea nearly two millennia later, but you had to take his word for it. Scientists could not devise any experimental proof.

Hope sprang anew in the late 1600s when Newton proposed his law of inertia—the tendency of moving objects to keep moving straight, unless acted on by an outside force. Experimenters realized that they could demonstrate the rotation of the Earth by dropping a round ball down a deep mine shaft. The Earth would turn while the ball was falling, and the ball would hit ahead of the spot directly beneath it at the moment it was dropped. (A ball falling 300 feet is deflected a little more than an inch in middle latitudes.)

Enter Jean Bernard Léon Foucault, a Parisian medical student who became more interested in physics than physiques. Foucault was a devout tinkerer. As a child he had been adept at devising mechanical toys. As a young man he realized that a pendulum would tend to swing to the same point in space, true to Newton's law, while the Earth turned beneath it. If he could demonstrate that, he would prove that the Earth rotated.



When Big Bertha shelled Paris during World War I, Coriolis effect would have deflected shells about a mile.

The young Foucault went to his cellar and built a pendulum using a six-and-a-half-foot wire. He carefully set it swinging by burning through a restraining bit of string. *Voilà!* The line of the pendulum seemed to turn slightly clockwise with every swing; in fact the Earth was turning underneath it. Foucault later built larger pendulums for the public, including one with a 220-foot wire at the Pantheon in Paris in 1851. It was a big hit. Foucault put a pin on the bottom of the weight, so it drew lines in wet sand spread beneath it, graphically illustrating the turning. He demonstrated the Earth's rotation by showing the twisting that is the essence of the Coriolis effect.

Pigs' tails notwithstanding, the most significant result of the Coriolis effect is on our weather. As masses of air move from high- to low-pressure areas, they take curved paths because of the Coriolis "force." This initial twist makes nearly all weather systems form in circular cells—storms, hurricanes, typhoons, cyclones (low-pressure systems), anticyclones (high-pressure systems) and the aptly named twisters, or tornadoes. Expanding anticyclones form clockwise spirals in the

Alan Linn, who reported new threats to the Acropolis in the March 1982 SMITHSONIAN, *has studied both pigs' tails and draining bathtubs for a number of years.*

The dizzying Coriolis effect

Northern Hemisphere; contracting systems—cyclones, hurricanes, tornadoes and waterspouts—are always counterclockwise.

"If there were no Coriolis effect, there wouldn't be any storms," says Dr. William L. Donn, a senior research scientist at Columbia University's Lamont-Doherty Geological Observatory in Palisades, New York, and former head of the meteorology section of the U.S. Merchant Marine Academy. "Any time the sun's heating of the Earth caused a low-pressure area, air would move in and that would be the end of it."

Near the equator, where the Coriolis effect is weakest, is the area of calms and light winds known to mariners as the doldrums. Thunderstorms do occur, but large differences in atmospheric pressure are quickly smoothed out. Hurricanes generally do not form closer to the equator than about five degrees of latitude.

The Coriolis effect also influences the ponderous movements of ocean currents. In spite of what your high school science teacher may have told you, water does not always seek its lowest level; oceans and other large bodies of water are not level. They are "piled up" by the winds and Coriolis forces.

The consequences of these Coriolis effects are of vast importance even to landlubbers. The ocean currents are the Earth's natural thermostat. The currents can carry vast amounts of heat from the equator to the poles. Without their moderating effect, continent-size ice cubes would accumulate at the poles. The tropics would become parched wastelands. Life as we know it would be possible only in narrow bands in the temperate zones.

The Coriolis effect also causes icebergs to move 30 to 50 degrees to the right of the wind direction in the Northern Hemisphere. Because of their immense momentum, the icebergs may continue to move—and curve—after the wind stops, making them even more of a threat to shipping. Even ocean currents generated by winds blowing along the surface move in a direction to the right of the wind; the velocity of such a current drops with depth but continues to turn to the right. The spiral formed by graphic representations of such currents—an imaginary line connecting the noses of the fish in the illustration on page 72—is named for the man who first described it mathematically, Swedish oceanographer and physicist Vagn Walfrid Ekman.

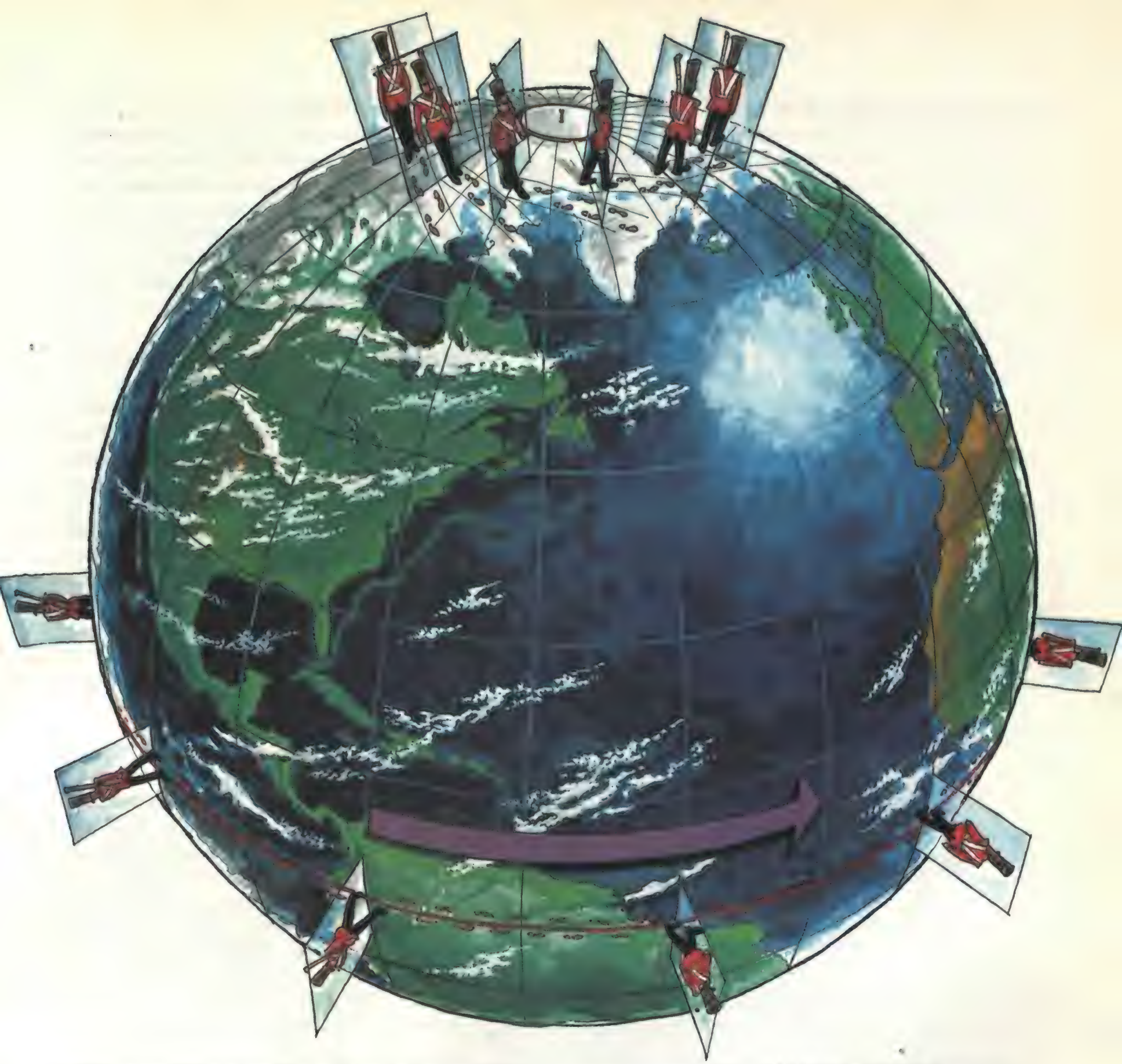
According to many geologists, Coriolis twisting produces lopsided valleys. River water is piled up against the right banks (looking in the direction of flow) in the Northern Hemisphere. In a mile-wide, rapid river, the difference in water level would amount only to about an inch, but even in smaller, sluggish streams a slight difference could cause more erosion to one bank than to the other. In fact, many rivers in the Northern Hemisphere do have steep right banks and gently sloping left ones, particularly the Missouri River and a number of rivers in Alaska, southern Long Island and Siberia. The effect is disputed by some geologists. In many areas local features, such as rocky outcrops in the riverbed, overshadow any Coriolis effect.

Not only rivers, but the entire surface of the Earth may be shaped somewhat by Coriolis twisting. In the 1970s, Martin F. Kane, a geologist for the U.S. Geological Survey, postulated that the Coriolis effect may have determined to some extent the shape and location of the Earth's continents. The tectonic plates (SMITHSONIAN, January 1975) in the Earth's outer crust are moving. Kane suggests that in the 200 million years or so since the continents broke off from a single supercontinent, parts of the plates north of the equator have moved east and parts south have moved west, causing splits along existing lines of weakness. His theory challenges the usual view that the plates are moved solely by convection currents in the Earth's hot, viscous interior.

Insomnia, no, but bathtubs, maybe

Scientists have their theories and you and I have ours. Besides pigs' tails and whirlpools, some people say Coriolis twisting affects impotence and insomnia (perhaps the two are related). They maintain that this can be counteracted by orienting your bed east-west with the Earth's rotation. (Others, just to be obstinate, insist that north-south does the trick.)

The whole question of whether water draining out of a tub whirls in different directions in different hemispheres has been taken up at least once in the scientific literature. In December 1962, Ascher H. Shapiro at the Massachusetts Institute of Technology described theory and experiment in the British journal *Nature*. He found that normally the Coriolis force



Soldiers marching along the equator (at bottom) line up one behind another; those along parallel of latitude in far north do not. When a soldier on the equator is carried forward by the rotation of the Earth to the position once occupied by the soldier before him, he will not have turned at all. A soldier at high latitude will have turned to the left. This twisting gives rise to the Coriolis effects we feel every day.

is much smaller than other forces present in a tub of water, including residual motion from the original filling, air currents in the room or even differences in temperature around the vessel. The Coriolis force is about 30 million times weaker than the force of gravity at middle latitudes, so if the tub is not perfectly symmetrical, the Coriolis force is overwhelmed.

Shapiro went on to build a special tub, however, and found that when all these other forces are removed, the water always does form a counterclockwise whirlpool in Cambridge, Massachusetts. He built a flat-bottomed tank, six feet across and six inches deep. The central drain hole was flush with the bottom and connected to a 20-foot length of hose. The tub was filled, covered with a plastic sheet and allowed to stand for 24 hours. Then a plug was pulled from the end of the hose and the tub began to drain. After 15 minutes a vortex appeared, turning counterclockwise.

A wind blowing over the ocean produces currents that curve more and more (to the right in the Northern Hemisphere) as they weaken with depth. The fish show current directions; their lengths show current strengths. Along west coasts of North and South America, winds and Coriolis force push surface waters offshore (arrows), letting colder water beneath well up.

If you keep an eye on the growing tips of your houseplants or garden plants for a day or two, perhaps when you talk to them, you may see that some plants sweep in a circle (or circumnutate, as botanists say). "Some plants always circumnutate in one direction, some always in the other, and most in either direction," says Dr. Mark Jaffe, a plant physiologist and growth expert at Wake Forest University. "The few times this has been tested north and south of the equator, the plants didn't seem to show any Coriolis effect."

During the years I spent as a farm editor in the Midwest, hog men from Kansas to Pennsylvania were willing to bet big money that pigs' tails generally twirl to the right in the Northern Hemisphere. They swore that the favored direction south of the equator was to the left. I could not check tails for myself because most herdsmen dock (amputate) them when the piglets are about a week old to eliminate tail biting in the ranks. But Dr. Hobart W. Jones, professor of animal science at Purdue University, has been asked about tail curls so often that he has taken to noticing the curl of the countless newborn pigs of eight major breeds that he has seen during a long career: "I can assure you that in this section of the country, the tails curl randomly in both directions. I see no reason whatsoever why the same would not be true south of the equator."

The possible effect on humans is a much thornier question. Little if any research has been done. Professor James E. McDonald, a physicist at Iowa State University who wrote on the subject in the May 1952 *Scientific American*, believed that people constantly and unconsciously correct for the Coriolis effect when walking. McDonald calculated that a person walking four miles per hour on a nearly frictionless surface, such as ice, but who could somehow still keep from falling flat, would drift about 250 feet to the right for every mile walked in the Northern Hemisphere. Normally, however, this does not happen.

A force that shrinks to insignificance

Even penguins do very little walking on ice. Usually, one foot or the other is solidly on snow or the ground and twisting with it—no correction is needed. When you consider that the force required to correct for the Coriolis effect on a 20,000-pound jet plane moving at 600 miles per hour is only about 55 pounds, the effort needed for a 180-pound human walking at four miles per hour shrinks to insignificance.

Similarly, the theoretical Coriolis drift on your car, if you are going the legal speed limit, amounts to nearly 15 feet per mile, but the frictional bond between tires and road easily negates the effect. Locomotives in motion exert about 300 pounds more weight on the right rail than the left (in the middle

latitudes of the Northern Hemisphere) and McDonald once checked to see if the right wheels were more worn than the left after years of service. They were not.

The next time you are on a jet, you may wonder how the pilot avoids getting lost in the face of Coriolis twisting. "Nowadays, we don't even think about the Coriolis effect," says Capt. David Leney, a Concorde pilot for British Airways. "All corrections are made by our computerized inertial-guidance system. Even in the days when we navigated by sextant, only a slight correction was needed. Pilots are never aware of any need to constantly bank left to correct for a Coriolis drift to the right."

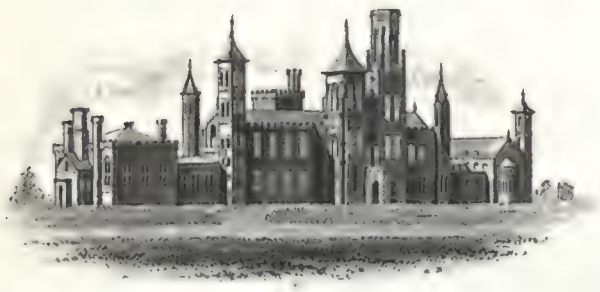
The Coriolis effect is sometimes invoked to explain the widely held belief that lost people tend to wander in circles. But the belief is true only some of the time, and even then the circling arises from other causes. "Rarely, lost people *do* wander in circles, particularly at night," says Chief MSgt. Bob Moran, a survival training manager at the U.S. Air Force Survival School in Washington State. Moran has seen thousands of lost men wandering north and south of the equator during nearly three decades as a survival-training instructor and tracker of lost persons. "When people circle, it's usually to the right, no matter what hemisphere they're in," Moran continues. "I think it's because people are taught from adolescence to drive to the right and pass objects on the right. Interestingly, lefties tend to circle to the right less than right-handed people."

The Coriolis effect also may influence geologic features on some planets. Dr. Anthony Dobrovolskis at the Jet Propulsion Laboratory in Pasadena has suggested that the ray pattern of debris blasted from meteorite and volcanic craters on Mercury and other planets may reflect the bodies' Coriolis effects at the time of the explosions. "These patterns may be basic to understanding the entire geophysical evolution of a body," Dr. Dobrovolskis says. If enough distinct ray patterns are found, they may reveal long chapters in the history of our solar system, in much the same way that tree rings can tell the history of a climate.

One day billiard-shooting Professor Coriolis' imaginary force may help unravel some of our solar system's remaining riddles.

In a Victorian reenactment of Coriolis' inspiration, rotating table causes cue ball to miss the target.

Two major new museums are coming to the Mall



Work has now started on the Quadrangle, a vital center for the understanding of Asian, African and Near Eastern cultures

For 137 years, the Smithsonian's scholars and scientists have explored and shed new light upon the history and art of the United States, and upon the cultures of people throughout the world from the earliest times to the present. But there is an important area to which we have been unable to do full justice: that vast and rich array of civilizations stretching from the Atlantic coast of Africa, across to the eastern Mediterranean, and east to the shores of the Pacific.

The Smithsonian's interest in these civilizations is of long standing. For decades Smithsonian art historians, archaeologists and

ethnologists have worked in these areas; our Freer Gallery of Art is the most important museum in America specializing in the art of of the Near East and Asia, and recently we were pleased to accept from Congress responsibility for the National Museum of African Art. But at a time when an understanding of non-Western cultures has assumed new urgency, we have come to realize that our existing facilities are inadequate to meet the growing need.

We are therefore beginning a major new project: the Center for African, Near Eastern and Asian Cultures, which we call the Quadrangle. I consider it the most significant single project this Institution has ever undertaken. It will make critically important contributions to the furtherance of mutual understanding and tolerance between us and other nations in an increasingly interdependent world.

Located on a four-acre site adjacent to the castle, the Quadrangle (described in detail in the following pages) will consist of two new museums and facilities for the Institution's outreach programs, including the headquarters for the Resident and National Associates, educational television and film, performing arts, traveling exhibitions and intercultural seminars. Above ground will be peaceful gardens and two pavilions that will serve as introductory galleries, one dedicated to Asia and the Near East, the other to Africa. The architect's view below suggests how the complex will appear when seen from the castle.

"No man is an island," wrote the poet John Donne, and never has that statement been more true than it is today. The speed of modern communication and transportation may have shortened the distance between us, but it has also exacerbated tension. Whirlwind overseas trips and the satellite transmission of stories about upheavals abroad hardly serve to improve our comprehension of our neighbors.

We need reminders of the civilizations of the two-thirds of the world that are not Western: of the medicine, astronomy and mathematics we owe to the Arab world, of the inventiveness of the Chinese, of the creativity of the African nations, of the persistence of faith among the Jews. Museums can provide such reminders in very special ways. In a museum things are laid out, explained, shown tangibly so that one

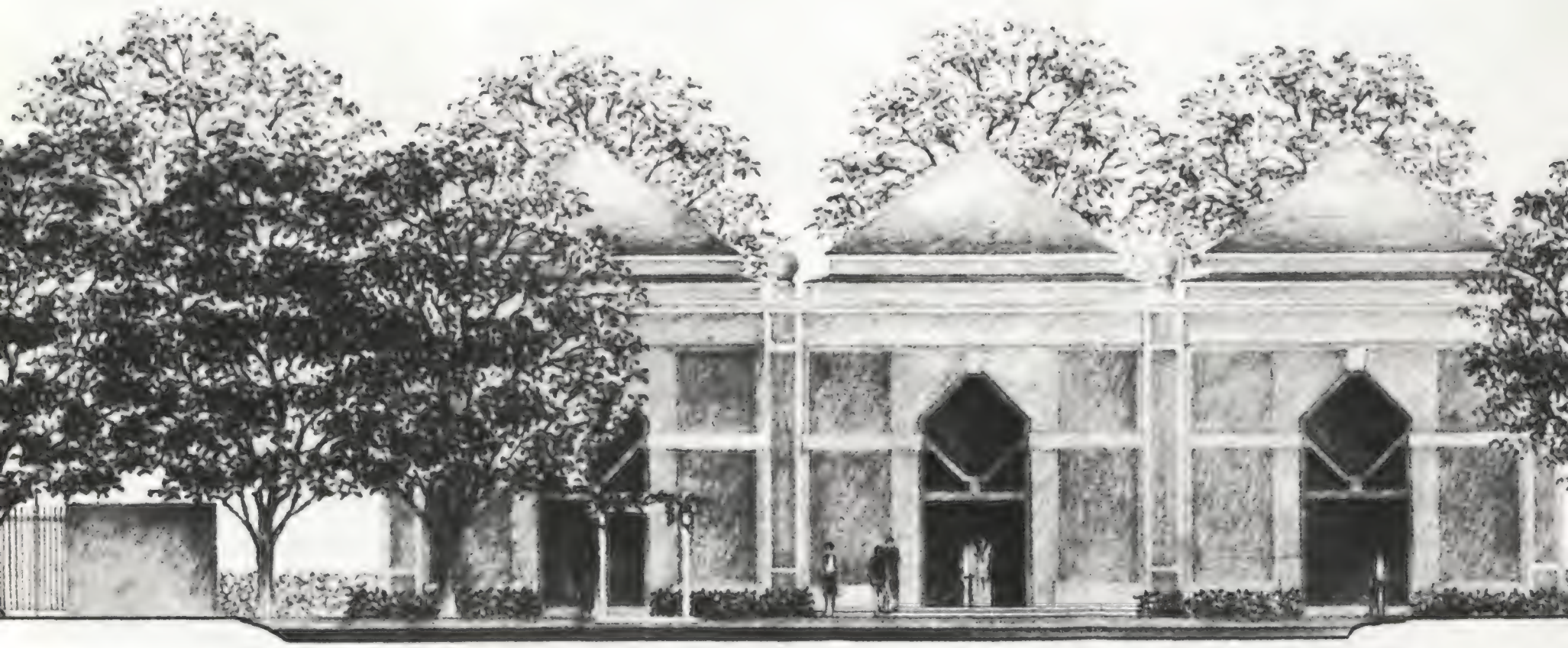
Fold out →

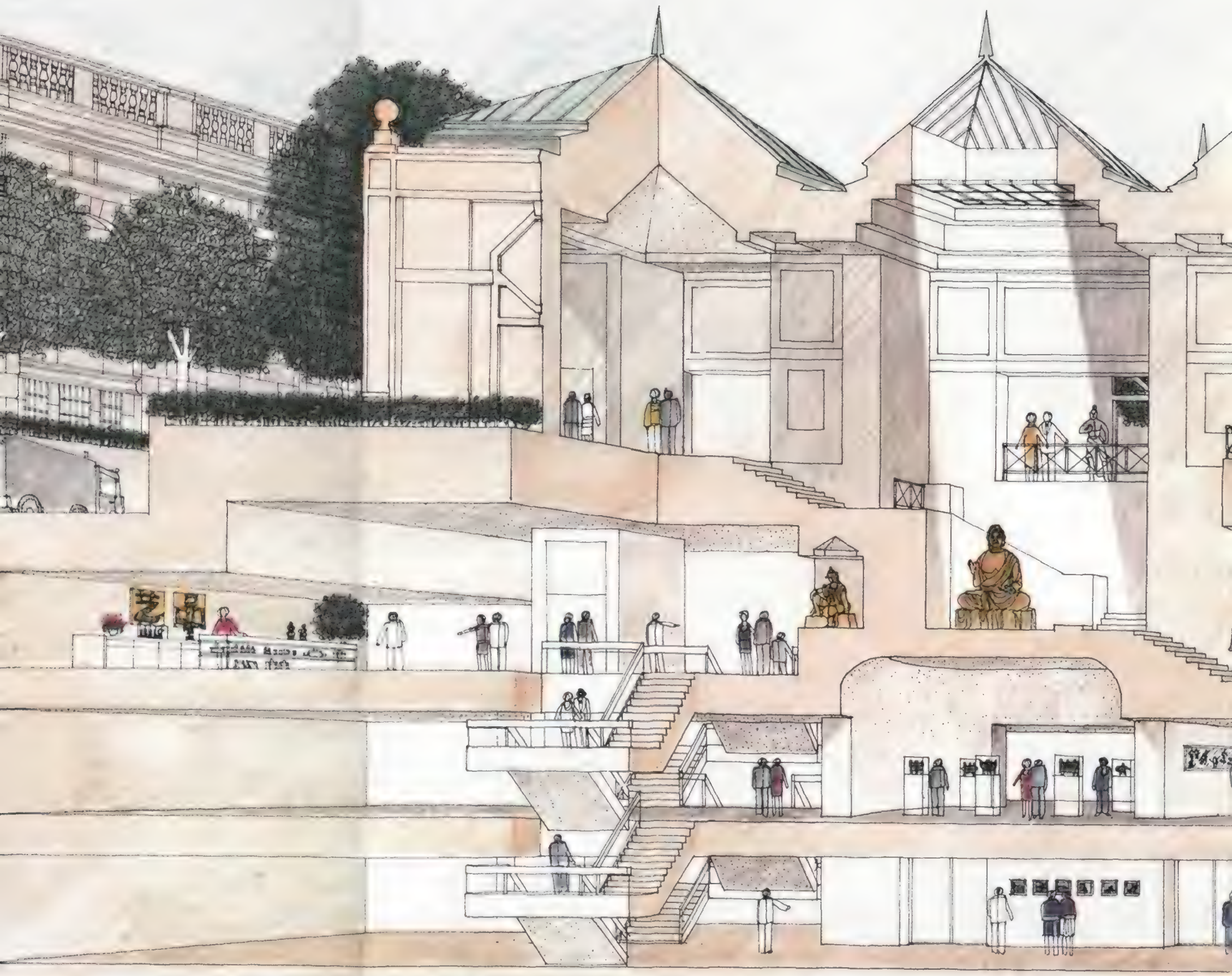
can see them, indeed often touch them, in a manner that is direct. The experience is more personal than what the television or movie screen can provide, more immediate even than reading. The Quadrangle will give our 25 million visitors each year (as well as all of those who see our traveling exhibitions across the land and in other countries) an opportunity to come into touch with the great cultural achievements of these vibrant peoples. Emphasizing both the rich diversity of these civilizations and the underlying brotherhood of mankind, the new center will make an important contribution to the global understanding on which our future depends.

But the Quadrangle will not be simply an exhibit space. It will be an international center for research and symposiums, a center for the exchange of ideas between cultures. As an apolitical showplace and forum, it will provide a meeting ground in which visitors from both worlds can gather in an atmosphere where all can feel at home. James Smithson spoke of his hope for the increase and diffusion of knowledge among *all* men. This institution was to benefit all, not merely Americans—but how better to benefit Americans than through this center, a living force for illumination and for hope?

Today, as I look out of my office window in the castle, I can see that the preparatory work on the site has already begun. The official groundbreaking will take place in July. But there is still a formidable job to do. Costs for the center are $75 million. Half of that sum will come in the form of matching grants from the federal government. The rest must be raised from private sources, like those who read these pages. Foreign governments and corporations have already made substantial commitments toward our goal, as have corporations, foundations and generous private donors here in the United States. But we still need the support of all of you friends of the Institution, including the Smithsonian Associates, and I am writing a letter to each of you about this matter. Together we will meet the responsibility foursquare.

S. Dillon Ripley





Cross-section view of the new Center for African, Near Eastern and Asian Cultures shows the surface

construction as it will be in relation to existing buildings, and also shows the underground facilities.

At left, above ground and adjacent to the Freer Gallery of Art, stands the entrance pavilion to the

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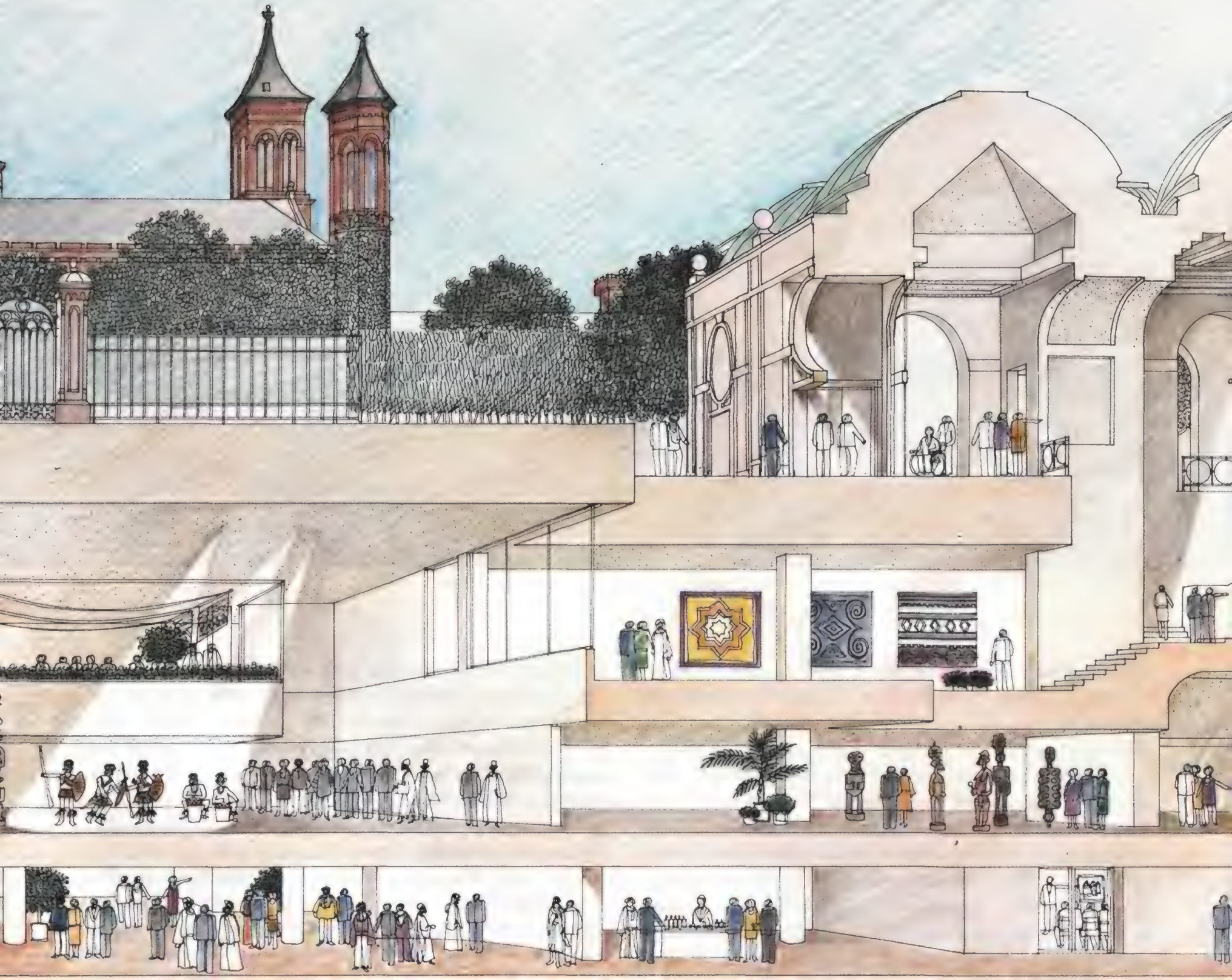
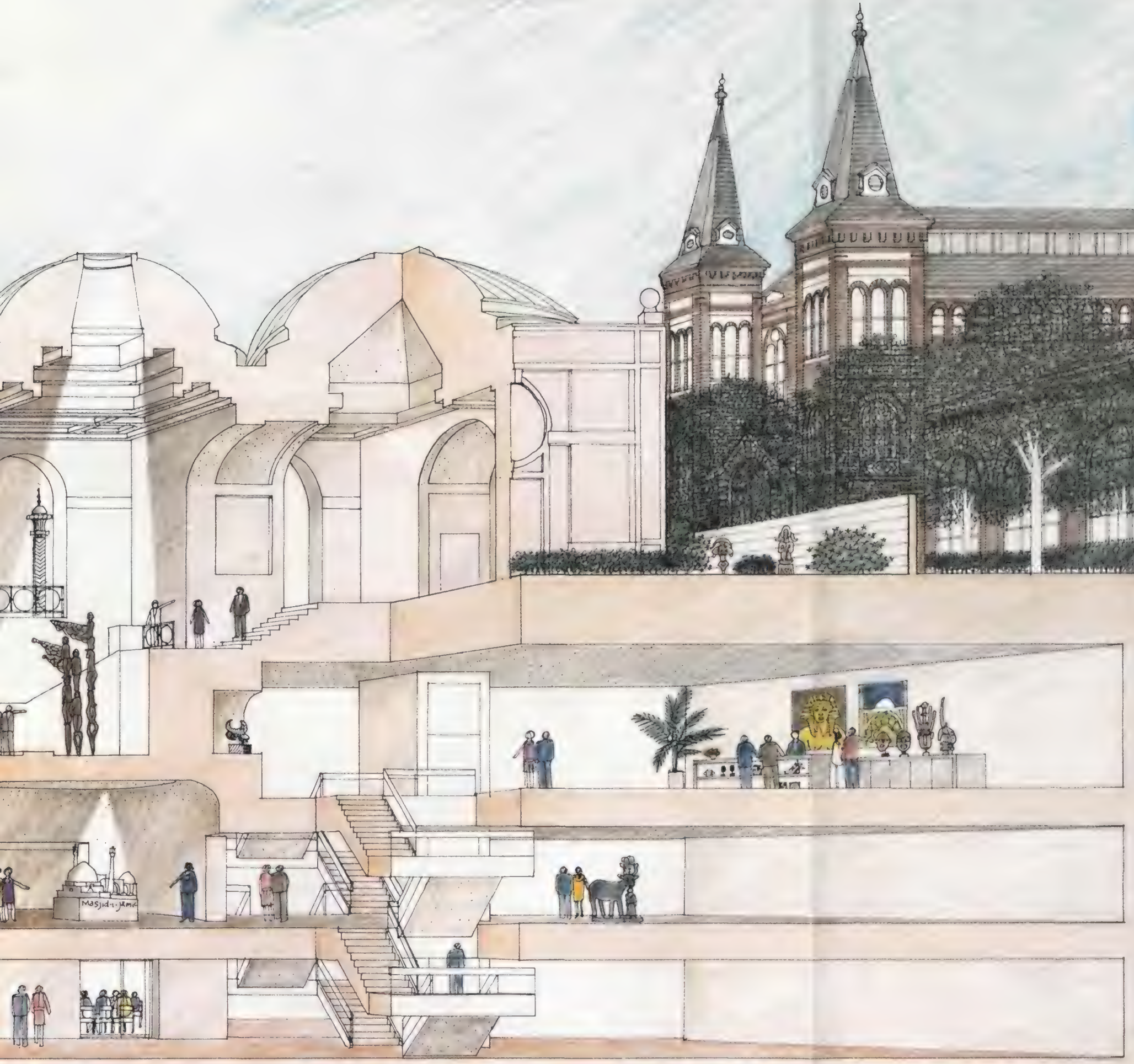


Arthur M. Sackler Gallery. In the middle, below the ground, the Sackler Gallery and National Museum of African Art share major exhibition space. Beneath it is a facility for international gatherings and



symposiums. At right, next to the Arts and Industries Building, is pavilion for the National Museum of African Art.

A winged jade chimera of the Han Dynasty expresses great animation for its size, only 5¾″ in length.

By Benjamin Forgey

Quadrangle's coming attractions—treasures from Asia and Africa

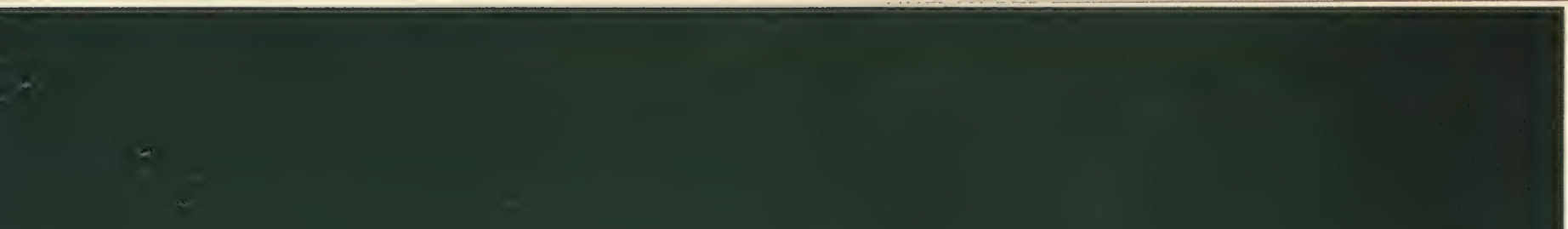
The Sackler Gallery, the Museum of African Art and a center for international symposiums are all included in the imaginative new plan

Construction begins this spring on the new Smithsonian Quadrangle, an unusual, many-sided museum and education complex on the Mall in Washington, and with any luck at all its doors will open to the public a scant four years from now. The Quadrangle, also known as the Center for African, Near Eastern and Asian Cultures, seems to have been blessed by good fortune ever since the idea hatched some years back in the brain of Smithsonian Secretary S. Dillon Ripley.

Two museums—making a total of 11 such buildings in the cultural gathering on either side of the Mall—will be the highlight of the Quad: the National Museum of African Art, transplanted from its attractive, if cramped, quarters in a series of 19th-century row houses on Capitol Hill; and the brand new Arthur M. Sackler Gallery, a repository of Oriental and Near Eastern art. Named for its principal benefactor, a New York medical researcher and publisher, this will be taking an honored place next to the Freer Gallery, one of the world's great storehouses of art from the East.

What Sackler did was to give the Smithsonian a stupendous gift of 1,000 works of fine art. He also pledged $4 million toward construction of the new gallery in an agreement reached last summer. The gift of art included 153 Chinese bronzes from the Shang (c. 1523-1028 B.C.) through the Han (206 B.C.-A.D. 220) dynasties, 68 Chinese paintings from as early as A.D. 960 into the 20th century, and outstanding examples of Chinese lacquer. The donation also includes large groups of metalwork pieces and sculpture from the Near East, India, Cambodia and Thailand.

But the museums are only part of the picture. There will also be a lovely park situated behind the Smithsonian's first building, James Renwick's romantic red



Tiny but precious hound, from the Tang Dynasty or earlier, achieves ideal marriage of color and form.

sandstone castle, and forming a pleasant retreat from the great, long, open space of the Mall. Beneath this charming garden a vast underground structure will encompass the museums' lower floors and other activities, including the new International Center, space for the Smithsonian Associates and the Smithsonian Institution Traveling Exhibition Service.

The Quadrangle project was a complicated, improbable and farsighted putting together of disparate pieces to create something entirely new. The odds against such an achievement even a few years ago were very great, but as Damon Runyon's Hot Horse Herbie once said, a story goes with it.

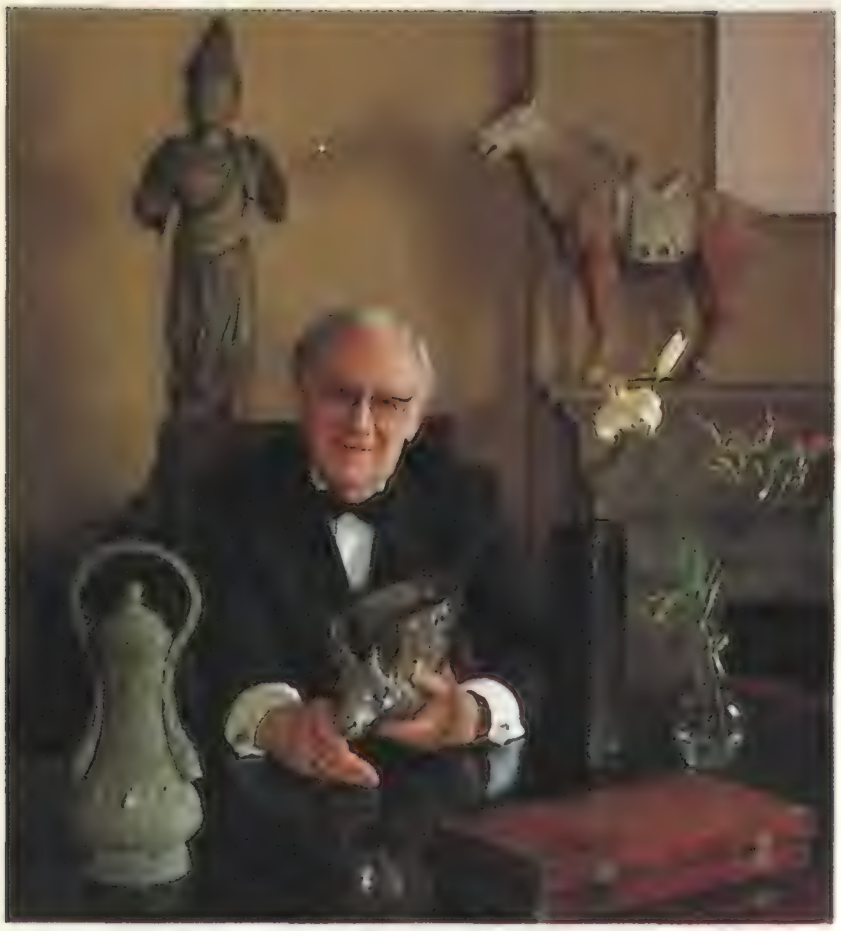
The story begins with Charles Lang Freer (SMITHSONIAN, January 1977), the Detroit financier who made enough money by midcareer to abandon business in order to pursue his yearning for an esthetic life.

Freer's contribution to the Quadrangle is twofold. The Mall museum that bears his name is, in the long run, the more important. Although not extraordinarily large when compared with other world-class Oriental collections, the Freer holdings (which have been added to judiciously over the years, raising the total from about 9,000 to more than 12,000 objects) stand out for their overall level of quality. But there is also the tradition of superb scholarship that extends back to the museum's official opening in 1923, which makes the Freer a model for the Quadrangle to emulate.

When Dr. Arthur M. Sackler, the first major donor of art and money to the new museum that will bear his name, explains (as he did in a recent interview) that "the true collector" sees himself "solely as a temporary curator" of the objects in his collection, he is in an important sense following Freer's time-honored example.

Photographs by Otto E. Nelson

Henry Groskinsky



Dr. Arthur M. Sackler, in his office, with works he collected, including Sasanian rhyton shown on cover.

Of more direct influence on the final form the Quadrangle would take, however, are two restrictions—both beautifully resolved by the Sackler bequest—that Freer saw fit to attach to his splendid gift. He did not want objects in the collection to leave the building in Washington—ever. Neither did he want objects from the outside world to enter the building for display or study alongside the precious pieces in the permanent collection. These limitations have become increasingly awkward in both practical and philosophical terms as the years have passed. By the late 1960s the Freer clearly needed to broaden its mission, and it needed more space for storage, conservation, study and display.

Under the direction of the late Harold P. Stern, a specialist in Japanese art, and continuing under his successor, Dr. Thomas Lawton, a scholar of Chinese art, the Gallery quietly set about accomplishing the former task without damaging its reputation for serious scholarship. But Freer's restrictions put a sizable crimp in these efforts.

The notion of expanding the Freer underground, in order not to mar the self-contained simplicity of the Florentine Renaissance palazzo that architect Charles Platt had designed with guidance from Charles Freer, was born in the late 1960s when Ripley asked Gordon Bunshaft, the architect who was then working on the Hirshhorn Museum and Sculpture Garden, "to give us some spare time" for the Freer problem. For a variety of reasons, Bunshaft's plans to expand the Freer underground on its Mall side did not bear fruit.

At this point the story bends back again, to the early 1960s and the Capitol Hill row house of Warren Robbins, a young man who had recently resigned from the State Department. Robbins was an enthusiast for, but by no means a specialist in, African art. Posted in Germany, he found he could not resist a "crazy" impulse to buy 25 or so African pieces from a dealer in a resort town near Hamburg. Back in Washington, he put the works on view on the walls and tables of his house and began inviting friends and acquaintances over to talk about them.

The Museum of African Art: an instant hit

This was the humble beginning of the National Museum of African Art. In 1963, one of the Washington homes of Frederick Douglass, the great abolitionist, publisher and orator who had been born a slave, came up for sale on Capitol Hill. From Robbins' own savings, his family, and friends of the idea, he scratched together a down payment on the Douglass house (actually half of a duplex that Douglass had owned) and had it incorporated as the Museum of African Art. It was an instant hit. Robbins, today the founding director emeritus of the museum, did not look back. It was touch-and-go at times, however. Pressures on the young museum grew inexorably. It, too, needed more space to accommodate enlarged programs, increased staff and a growing collection (which now numbers more than 7,500 objects). By the mid-1970s it had become apparent that the museum needed a stabler, more permanent kind of support. Alliance with the Smithsonian Institution seemed natural. That is exactly what occurred, with the strong support of the late Senator (and former Vice President) Hubert H. Humphrey and other Members of Congress.

The Smithsonian now had two space-hungry museums, the Freer and the National Museum of African Art, plus several other organizations tucked inefficiently here and there in buildings along the Mall. One space beckoned: a plot of green and macadam, part Victorian garden and part parking lot, bordered on the west by the Freer, on the north by the Smithsonian castle, on the east by the Arts and Industries Building and on the south by a long, broad stretch of Independence Avenue. "It gave us the idea," Ripley says, "to create in that space a college, a collegial atmosphere, with a garden and an underground space to do with what we would."

Benjamin Forgey writes on architecture and art for the Washington Post. *He last wrote about the* De Stijl *movement in the February 1982 issue.*

Designing the structure was bound to be devilishly hard. Ventilation posed a problem; entrance and exit for both pedestrians and service vehicles had to be commodious and attractive; museum security had to be maintained and functions separated; light was a constant concern; and most of all the visible parts of the building had somehow to coexist on equal terms with three extraordinarily dissimilar buildings: Renwick's castle, with its romantic profile of towers and battlements; Arts and Industries, a splendid Victorian shed in polychrome brick, designed in 1878 by the Washington firm of Cluss and Schulze; and Platt's Freer building, sedate and almost self-effacing.

Junzo Yoshimura was the first architect called in to work on the problem. Yoshimura initially conceived the idea of placing two pavilions symmetrically in the park. He also was adamant about preserving a great old linden tree on the site, telling Ripley that a mere human could not possibly design something so perfect. As a result, a notch three floors deep was cut into the northeast corner on the floor plans of the underground structure; the linden was to be saved. When failing health prevented Yoshimura from following through on his plans, the task fell to the Boston firm of Shepley, Bulfinch, Richardson and Abbott and its principal designer, Jean Paul Carlhian. "It's the dream of any architect, the best commission in the world," he says.

Carlhian was to need his reserves of passion and patience during the formidable course of design reviews that are the architect's fate in Washington. Throughout the process he and the Smithsonian adhered to the original idea of the flanking entrance pavilions. However, the size and form of the buildings did change a good deal during the discussions: they got smaller and they lost the "national" flavor attempted in early designs.

To bring it all together—in style

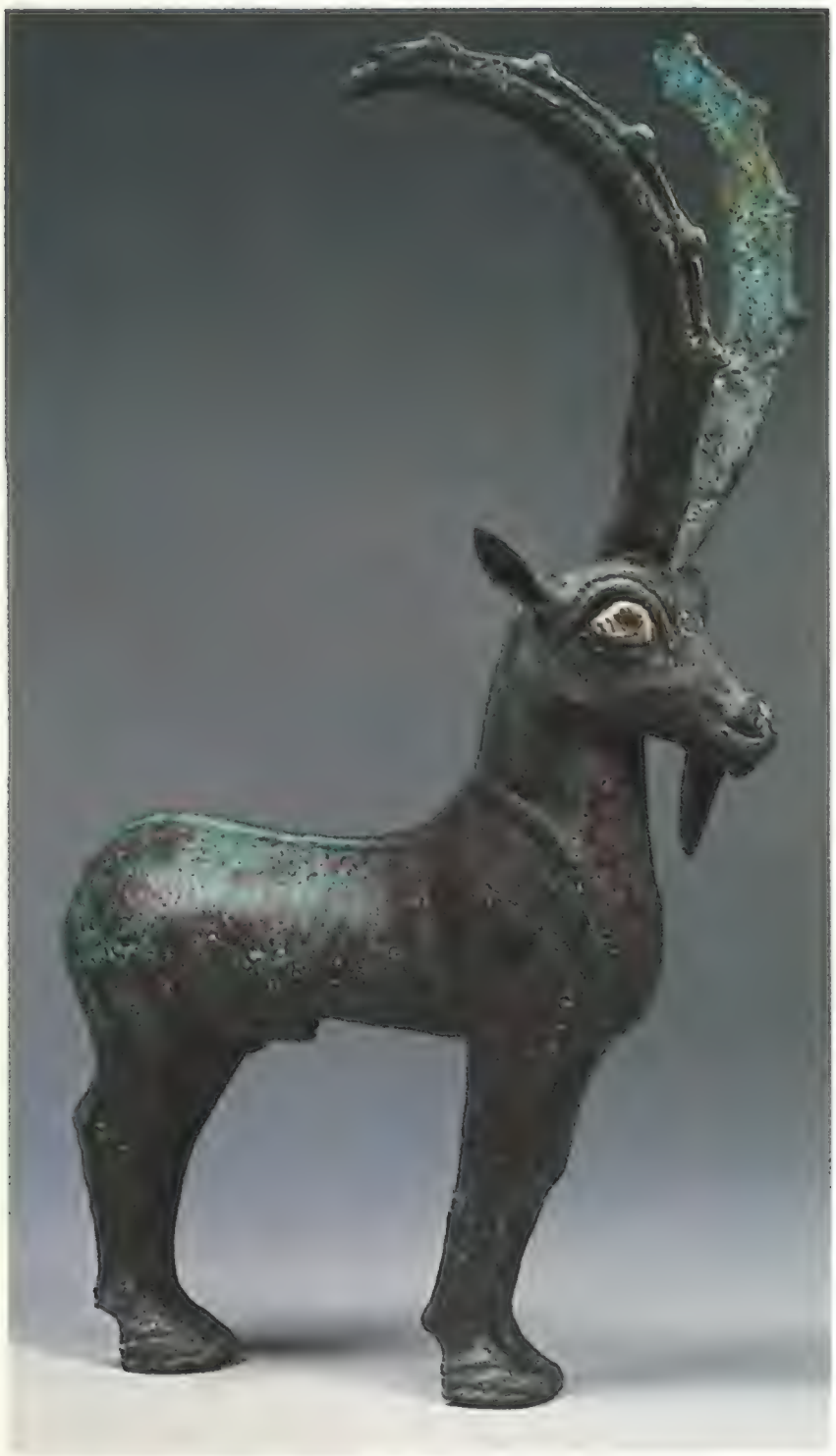
From the beginning, Carlhian said, he also had rejected the idea of building a "little Freer" and a "little Arts and Industries," like "Papa Bear and Baby Bear." Neither did he want to "add systematically to the confusion" by designing two "distinctly modern" buildings for the garden. What he wanted above all was "to bring things together" with a certain style, and what he wanted was basically what he did.

The designs that finally emerged are rectangles, like the Freer, and they have something of the Freer's reticence in the abstracted classicism of their cornices and window and door bays. Then, too, they have something of the effervescence of the castle and the Arts and Industries Building in their articulated rooflines—a sequence of six copper pyramids (in two rows of three) for the Sackler Gallery and of graceful domes, also

Infinitely delicate flower is from an album painted by the Chinese monk Daoji in the late 17th century.

A provincial Shang Dynasty bell (c. 1523-1028 B.C.) complements urban bronzes in the Freer Collection.

Coming attractions include treasures of art



Bronze goat from Iran dates from first millennium B.C. and is an outstanding example from early age.

copper, for the African Museum. Subtly classical and yet unmistakably contemporary, the buildings bear the distinct imprint of Carlhian's personality and his early training at the Ecole des Beaux-Arts in Paris.

Extreme care was taken to place the buildings just so upon the site ("like furniture on a rug," one design reviewer said). The exact position of each was determined by the intersection of sight lines from the castle's south tower, the middle of Independence Avenue and the corners of three existing buildings. Materials, it is hoped, will combine reticence with richness; they were carefully selected for fine modulation of light, color and texture (flecked granites with four different finishes on the outside and a change of tone from pink-gray to gray-pink from the African to the Asian building; limestone walls with varying floor and ceiling finishes within). Carlhian also paid special attention to the design of the central, skylit stairwells inside each structure, arranging them in a rectilinear cascade with four levels, so that walking down into the main galleries should be delightful and surprising.

As Carlhian and his associates chipped away at the hundreds of esthetic and practical problems of designing the multifaceted building, Ripley and his Smithsonian colleagues contemplated two major hurdles: money and collections. The financial problem seemed more manageable when Congress agreed in principle to the idea of sharing the estimated $75 million construction cost equally with the private sector, but no one involved was able to breathe easily until last October when a federal contribution of $36.5 million was finally appropriated. (In 1981 Congress had voted $960,000 for planning.) Private fund raising is under way. The governments of Japan and Korea made substantial early contributions to the project, and corporations and individuals have responded so that to date nearly $28 million has been raised.

Stocking the new Oriental gallery

No one was sure what precisely would go into the new Oriental gallery, although it had been decided that because of Charles Freer's restrictions it would have to be an independent institution administered by the director of the Freer. But the new museum would have some 26,000 feet of exhibition space, about 6,000 more square feet than the Freer itself has for displaying its permanent collection. Smithsonian officials had talked to many potential donors with no solid results when Ripley encountered a lawyer at a Washington party, who suggested he take a look at Dr. Sackler's collection in New York. "I said I'd love to see it," Ripley recalled. "We had heard of the 'Sackler enclave,' of course [where much of Sackler's Oriental collection has been stored at the Metropolitan Mu-

seum of Art], but it was primarily casual on our part. I never dreamed he would do what he's just done."

Ripley and Sackler obviously hit it off, although those close to the negotiations say there was no ardent wooing, certainly nothing to rival the drama of Lyndon Baines Johnson draping his long arm over the shoulder of little Joseph H. Hirshhorn at the White House, helping to convince that collector to bring his modern paintings and sculptures to Washington.

There was, however, what Ripley calls "an amusing coincidence" during their first encounter, which is just the sort of thing "collectors of collectors" (in the phrase of John Walker, former director of the National Gallery of Art) cherish at such moments. Visiting Sackler's townhouse after touring some of the collector's works stored at the Metropolitan Museum, Ripley was astonished to recognize a beautiful piece of Ming furniture in one of the bedrooms. "I remembered it immediately because I had always been captivated by this furniture," Ripley recalls, "and it used to belong to Bill Drummond." (Drummond was a friend and colleague of Ripley's in Asia in the Office of Strategic Services during World War II.)

The most subtle of courtships

Sackler, Ripley says, "practically fell over. He said, 'Yes, I bought it from Bill Drummond.' " Recalling the whole sequence of events that culminated in his donation, Sackler comments, "I didn't even realize Dillon Ripley was courting me. It was as subtle a courtship as has ever been, but probably the most effective one I've ever encountered."

Dr. Sackler is, as Freer was, a self-made multimillionaire, and like Freer and many other outstanding collectors from Andrew Mellon to Joseph Hirshhorn, he decided to donate an important body of artworks to the nation's capital, a city that is, in his words, "more uniquely American in its visitors than any other." At an age when most are considering retirement, he exudes a sort of energy that propelled him to success in three widely disparate fields: as a research psychiatrist he has published more than 140 scientific papers; as a publisher he is involved in a wide range of medical magazines all over the world; and as an inveterate collector of art he has become known to dealers, scholars and museum people the world over.

It is not entirely surprising to find a certain symmetry in Sackler's lifelong interests. As a student, he edited extracurricular publications wherever he went, from Erasmus Hall High School in New York City to New York University to medical school; his first love was art and he majored in art history at NYU and took studio courses at Cooper Union; and he bought his first piece of art while still an intern at Lincoln Hospital in the Bronx. "I became interested in collecting," he recalls, "when I realized the limitations of my own [artistic] talents and at the same time developed a passionate interest in the potentials of medical research."

Despite granite from which it is carved, this Chola Dynasty Indian goddess is suffused with tenderness.

He did his first serious collecting in pre-Renaissance Italian painting, but in 1950 Sackler began what he has called a "spiritual pilgrimage from my roots in the Western arts . . . to the esthetics of the East." (A few years ago he came back, by way of European terra-cotta sculpture.) Sackler has definite ideas about his role as a collector. For one thing, he says unequivocally that he has never sold a work of art. "I see collecting as an opportunity to make a personal statement," he comments, "to express a philosophy, to illustrate a point of view." Sackler's view reaches beyond esthetics toward a broader social context. "There are those who would collect primarily from an esthetic perspective," he says, "and while I feel that pull very, very strongly, art to me is much more. It represents the continuity of Man. . . . I collect, as I have often

Robert C. Lautman

This 16th-century ivory spoon from Nigeria, part of Museum of African Art collection, will move to Quad.

said, as a biologist would collect, and after, let's say, the initial excitement of recognizing in an object a truly creative expression of another individual's emotion . . . I become interested in the relationship of different types of creative processes to one another." Furthermore, he sees himself as a "very sensitive" donor. "As a student I had resented alumni who thought because of contributions of money they would be able to dictate art policies. I just think that's wrong."

An important aspect of the Sackler gift is that Dr. Lawton, the Freer director who will also become the director of the Sackler Gallery, was able to select precisely the works he wanted from the voluminous collection, which has some 5,000 works of Asian art. The result is that the Sackler objects complement the Freer collection extremely well. The Freer, for instance, has a superb collection of Shang bronzes, which for the most part originally came from the great urban center at Anyang, where professional archaeological excavations were begun in 1928. By contrast, Lawton points out, bronzes in the Sackler collection represent a "wide-ranging panorama of styles from provincial centers all over China that we are only now beginning to appreciate," giving scholars a new picture of Shang culture. The two collections, Lawton believes, "will make the Smithsonian *the* center of study for Asian art in the whole world."

Another crucial facet of the donation is Sackler's interest in serious scholarship, which has shown itself in programs during the past two decades at Columbia, Princeton and Harvard universities. This dovetails precisely with the Freer's record in such matters. Coincidentally, one of the works published by the Arthur M. Sackler Foundation is a book on Chinese painting, *Studies in Connoisseurship*, based on the Sackler collection and written by Marilyn and Shen C. Y. Fu. Lawton calls it "the finest statement we have about the subject in our language." Dr. Shen Fu is curator of Chinese painting at the Freer.

The Freer-Sackler potential in the scholarly fields contrasts in an interesting way with the educational philosophy of the National Museum of African Art, which made its reputation with innovative educational programs, including visits to the museum by thousands of school groups; extension services; and full-credit courses offered at sponsoring universities. Under the new arrangement, says Dr. John Reinhardt, who until last month was acting director, "the museum will pursue its outreach program with a vengeance" while upgrading the quality of the collection and scholarly programs attached to it. Reinhardt, who is now the Smithsonian's Acting Assistant Secretary for History and Art, is being succeeded as director by Sylvia H. Williams, who comes to the Smithsonian from the Brooklyn Museum. The approaches of the two museums are certain to enhance Ripley's vision of the new Center for African, Near Eastern and Asian Cultures as a place for the widest possible learning.

"I feel quite passionate about it, that we are missing part of the boat," Ripley has explained. "As a nation we have subjected these parts of the world, especially since World War II, to a kind of disrespect. So, we certainly can't expect the people there to respect us. Our museums have this tremendous obligation to tell Americans about this part of the world, and help them learn what that is all about." He also thinks back to Joseph Henry, the first Smithsonian Secretary, who saw the place as a "college of discoverers." "It follows," Ripley says, "that every sensible college ought to have its Quad."

Benin head and other prized holdings of African Art Museum will be on view more often in new Quad home.

Robert C. Lautman

By Bruce Beehler

For gaudy display, it's hard to beat birds of paradise

Sexual selection has reached a peak in New Guinea, where competition among male birds has produced some bizarre adaptations

The clear piping notes of a male sickle-billed bird of paradise ring through the high crown of the New Guinea mountain forest. Soon afterward I hear the low growl of a Magnificent Riflebird—then the guttural two-note shriek of a six-wired bird of paradise. I am huddled in the damp observation blind that looks out at the traditional dance ground of a male Magnificent Bird of Paradise (p. 92). The pale gray mist of predawn puts a chill in the motionless air.

A rapid mechanical clacking sound of wingbeats announces the bird's arrival. Sitting a few yards above me in the shrubby understory he calls a series of rolling "churrs" to broadcast to females within earshot that he is now at his display bower. In a few short flights and hops he descends to the arena and begins clearing the dance ground of leaves that have fallen during the night. He fashions his bower by sweeping a patch of forest floor clean of litter, then by plucking leaves and bark from the vegetation immediately above the cleared ground. The focal point in the arena is the thin vertical trunk of a small sapling on which the male, with his bizarre ornamental plumes, performs his courtship dance. When a female approaches, the male ascends to the vertical dance perch and begins an elaborate and sometimes comical display that culminates, some of the time, in mating. In the courtship dance the male erects, expands and waggles his odd and multicolored assortment of feathers in a showy ritual. The female lacks the ornamentation and refrains from any sort of dance; she merely watches. The male is working to convince this female that he is the most beautiful and desirable creature in her world. If she is impressed and mates with him, his investment has paid off.

The male is spectacular, but it is not immediately obvious as to why he has all of these unusual and beautiful adornments. After all, they do not help him hide from predators, nor do they help him forage for food more efficiently. Only when one sees the male display to a female does one begin to understand.

The 42 known species of birds of paradise inhabit New Guinea and parts of Australia and Indonesia, mostly in mountain habitats. Macgregor's Bird of Paradise occupies only the upper limit of the timberline, between 9,500 and 12,000 feet above sea level. Most are widespread forest birds, but some require special habitats. All belong to the bird family Paradisaeidae, and are best known for their peculiar displays and spectacular plumages. They include species that are among the most beautiful birds in the world.

I studied four species of birds of paradise in Papua New Guinea, the sovereign nation that occupies the eastern portion of the island of New Guinea, spending two and a half years at the Wau Ecology Institute there. Now I have some suggestions as to why the birds look and behave as they do.

Fantastic arrays of the paradisebirds

Birds of paradise are starling- to crow-size songbirds believed to be most closely related to the crow family. But while birds of paradise resemble crows in size and in some of their vocalizations, at that point the similarity ends. The paradisebirds, as they are sometimes called, show a striking variation in form and plumage unrivaled by any other bird family—iridescent blue-green feather gorgets adorning the throats, flag-tipped wires (shaftlike feathers) protruding from heads or tails, shimmering feathers of ruby and gold color enlivening the bodies. One species' eye has an iris of two colors—yellow and blue; this in itself is not unusual, but the bird can expand and contract the inner and outer colorings to shift from an all-yellow to an all-blue iris in one second. Even more unexpectedly, many species have brightly colored mouth linings. In different species the mouth is colored lime green, orange, black, yellow or blue.

The first clue to these "outrageous" physical attributes is that among the gaudy species the male is gorgeous while the female is drab. This is true throughout

With plumes spread to form a triangle, a Blue Bird of Paradise hangs upside down in a courtship display.

A male Magnificent Bird of Paradise puffs out his breast feathers as he begins his courtship ritual.

the family. In some cases the differences between sexes are so extreme that it would be impossible to tell, without prior knowledge, that the two were related. This sexual dimorphism is thought to indicate the operation of "sexual selection." Charles Darwin, who coined the term, pointed out that there are two forms of sexual selection. In one, males compete among themselves for a dominant position; the one that wins automatically gets the female. In the other, the males compete in attempts to woo the female, but in this case the female rather than other males, by her choice of a male, determines the winner. Birds of paradise, I believe, tend to follow the second pattern.

In the birds of paradise that have been studied, the highly adorned species are promiscuous—there is no pair-bonding; the females visit the males at their display areas strictly for the purpose of mating. The obvious effect of this behavior on natural selection is that those males who can woo a preponderance of females will see their genes passed on to the next generation in high proportions. The males with the most sex appeal—whether it is loudest call, largest size or longest plumes—will mate most often, and the next generation will carry on their special traits. In some birds of paradise one or two males in any locale might perform more than 90 percent of the mating. Such "skewed" mating brings about rapid evolution of physical or behavioral traits that are attractive to females.

The exceptions that prove the rule are the monogamous species. In these birds, both male and female form a pair-bond and help each other throughout the nesting cycle. In many cases the plumage of both sexes is quite similar. None of the purportedly monogamous birds of paradise possesses the gaudy ornamentation so common among the polygamous species. Nor do they exhibit the spectacular behavior of their showy counterparts. The display of the Trumpet Manucode, for example, is simple, perfunctory and transitory. Little energy is spent attracting a mate in this species.

Contrast this with the life-style of the Blue Bird of Paradise. The adult male is an elegant black bird with turquoise-blue wings and gauzy, deep-blue display plumes. Add to this two long tail streamers and an ivory bill and incomplete white eye-ring, and the effect is impressive. The female lacks the male's gaudy features, although she does have the distinctive blue wings and ivory beak. The sexes are rarely seen together in the forest and form no pair-bonds.

A plumed male Blue Bird of Paradise frequents a single display area in a tree or group of trees. Individual males are widely dispersed; rarely are the display trees of two males closer than 300 or 400 yards. A male spends most of every day of the year near this display perch, although he will, at times, range far and wide in search of fruit. From his perch he calls much of each morning and in the late afternoon. Day after day I have heard males calling from their traditional posts, giving hundreds of calls daily.

Zoologist Bruce Beehler is the author of Upland Birds of Northeastern New Guinea *and is currently at work writing a field guide to the entire island.*

When a female visits a male Blue Bird of Paradise at his perch we see a beautiful sight. In his courtship dance the male drops backward into an inverted position, hanging from his dance limb (p. 90). He then fans his blue flank plumes into an umbrella over his body, tucks his head into his side, and becomes a stylized geometric pattern of rich color. Such elaborate displays are found in polygamous species but are rare among monogamous birds.

Lawes' Six-wired Bird of Paradise (p. 94) is another solitarily displaying bird of paradise that possesses both an ornate display and a polygamous life-style. The male constructs a dance ground on the forest floor. His dance arena, however, depends upon the presence of three slim horizontal branches arching over the cleared patch of ground. These are his rest perches and also serve as observation perches for the visiting females.

In the early morning the male gives his raucous two-note scream from the vicinity of his bower. When a potential mate is attracted, the male drops to the cleared dance space and immediately assumes his rather bizarre yet strangely beautiful pose—with head wires thrown forward, flank plumes out about him like a skirt, and with the short silver plumes above his beak erected into a pompon. The male then makes short hops, strutting silently before the female and tossing his head wires from side to side with jerky motions of the head. The skirtlike flank plumes sway to the movements. In many instances the single dance routine will not convince the female. She will avoid the male's advances at the dance's completion, but she will return to one of the observation posts shortly after to watch another dance routine. He will perform persistently until she agrees to mate—or departs.

While the displays of the Blue and of Lawes' Six-wired Birds of Paradise are unusual, they are not as spectacular as that of the golden-plumed Count Raggi's Bird of Paradise (SMITHSONIAN, July 1970). Here is the consummate bird of paradise. Indeed, some people think that this is the *only* bird of paradise. Count Raggi's Bird of Paradise is a little larger than either the Blue or Lawes' Six-wired, and its ornamental plumes are among the most extravagant, as well.

With his outspread wings, a male Queen Victoria Riflebird displays on a tree stump in the rain forest.

The iridescent breast shield and wirelike plumes behind eyes mark Lawes' Six-wired Bird of Paradise.

While female and juvenal plumages are dull–drab yellow, buff and brown–the adult male is difficult to describe for all his frills. Some of the textures and hard-to-see aspects are the crown feathers, forming a pale yellow, velvety "crew-cut" that offsets the metallic-green throat. The mouth is pale yellow. The silky and translucent orange flank plumes that trail over the tail are actually pectoral feathers; they grow out from the sides of the breast, underneath the wings (p. 97).

The display of Count Raggi's Bird of Paradise is communal. Three to six males share a traditional dance tree, usually centering on a few branches. The males assemble and display nearly every day for most months of the year. Display ceases only during the annual molt, when the males lose their plumes. Each subsequent molt produces longer plumes, thus the oldest birds are the most impressive.

With a loud series of cawing cries, males announce their presence at the dance tree. When an inquisitive female approaches, the males dance about and call excitedly, bending forward, throwing their plumes high and extending their wings upward, then clapping the backs of the wings together. This initial dance is highly agitated and almost chaotic. Each individual is attempting to catch the eye of the female. As the female looks through the confusion of plumes and color, she makes a tentative choice among the contestants. She indicates her choice by dallying near the perch of her favorite. This male then begins a silent, static display; he leans far over his perch, nearly inverted, throwing his plumes over his head so that the brightest portion of the golden-orange feathers flashes in the female's face; he sways slowly but deliberately. The interested female will often, at this point, approach the male, plucking at his nape feathers and occasionally mounting him for a few seconds. This does not interrupt the sequence, which next sees the male hop to a position

A female watches intently as a male performs his courtship dance in the arena he tends every day.

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In the first phase of communal courtship, a male Count Raggi's Bird of Paradise calls from his perch.

Their most vigorous display completed, males sway gently as they wait for females to approach them.

beside the female, with one of his wings spread over her. He throws his bill back and forth across the female's and makes powerful downstrokes with his wings, pummeling her. This increases in tempo and intensity until the male mounts the crouching female for a brief two or three seconds. Almost immediately after copulation, the female departs. In this species a single male may mate with three or more females in one morning.

Why do we find this polygamy among birds of paradise? As British ornithologist David Snow has pointed out, fruit eating has a lot to do with the answer in the case of tropical forest birds. With plentiful food available all year, only one parent is needed to feed the young, and that one is invariably the female. With no such responsibilities, the male is free to mate with as many females as he can attract. My studies in Papua New Guinea tend to support Snow's thesis, although the situation is not simple and many of the answers remain tentative.

Actually, most birds of paradise eat both insects and fruit, though in very different proportions. Insect eating encourages establishing and defending territories, because there are not enough insects to share. Such birds are almost always monogamous. Fruit-eating birds, on the other hand, often have a food supply so abundant it can easily be shared, and thus they have wider possibilities for social interaction. For them polygamy is a viable alternative.

To support this view, ornithologists point to similarities between the birds of paradise and the like-behaving bowerbirds of Australasia and the unrelated manakins and fruit-crows of South America. These latter are not so spectacular looking, although the male cock-of-the-rock (SMITHSONIAN, January 1983) is hardly drab, but their courtship rituals are remarkably similar. Equivalent conditions appear to have produced equivalent behavior.

Among birds of paradise, it is not just a question of fruit being available but of the nutritional quality of that fruit. If the birds eat fruit that is rich in fat and protein, then it seems that one parent can easily satisfy the needs of the young. If they eat fruit that is mostly carbohydrates and water, however, then much more is needed to provide the same nutrition to the young and both parents have to work at it.

Polygamy even occurs in a compromise situation, in which the female catches and feeds high-protein insects to the young while subsisting on fruit herself. Catching insects is harder work than picking fruit; if she had to catch enough for herself and the young, she probably could not do it alone. The split diet enables her to do both, again freeing the male for polygamy.

The plumes of some of the birds are of great value to New Guineans. The most prominent plumes are worn in traditional headdresses during "sing-sings"—festivals related to feast days, initiation rites or marriage ceremonies. This culling of plumed male birds of paradise apparently has had no seriously detrimental effect on the populations. New Guineans are traditional conservators of their local fauna. Regional councils often monitor hunting practices and the population levels of desired game species. In some situations where animals seem threatened there are

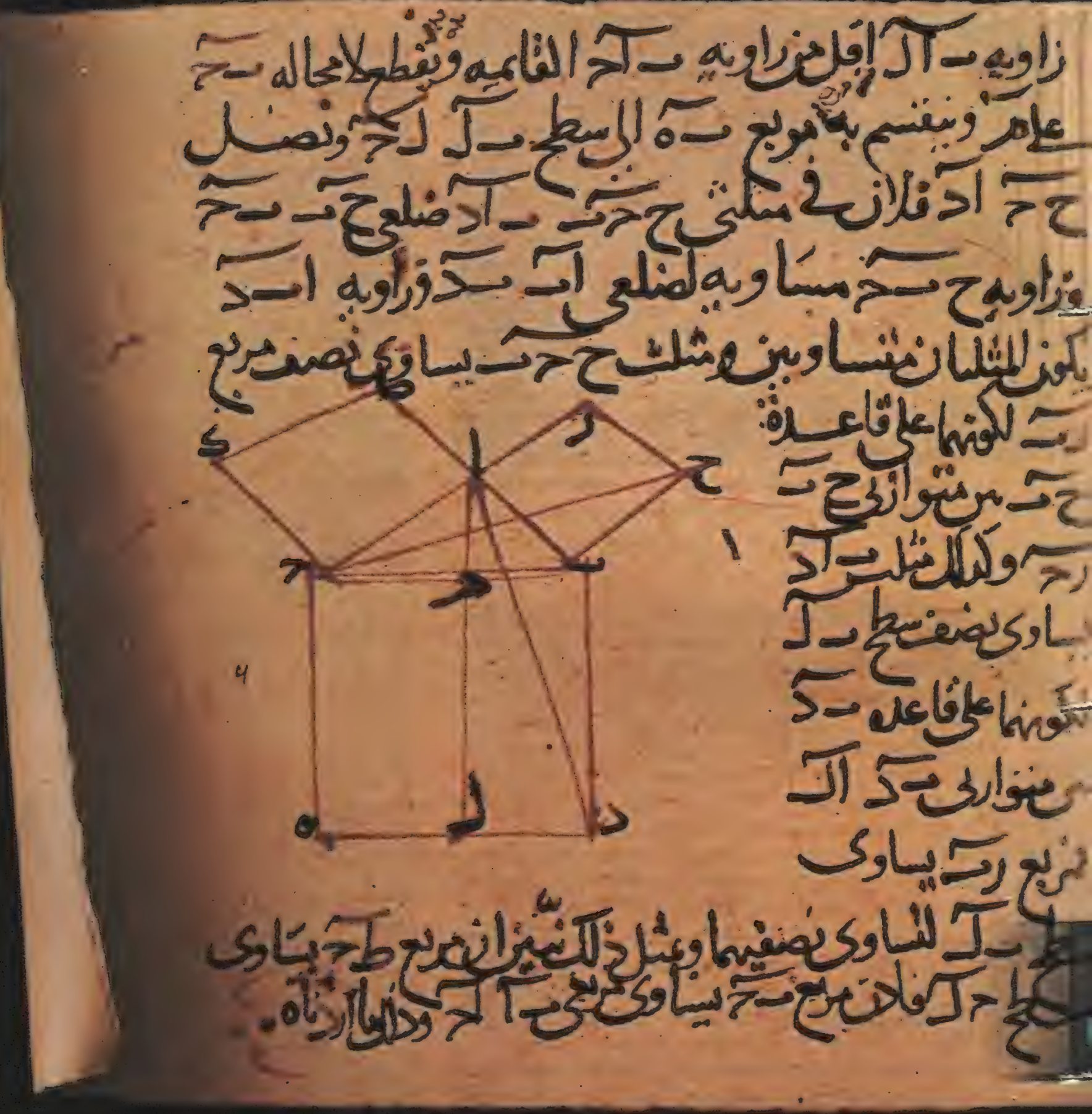
Near success, a male nuzzles a female while another female (right) and one young male (at far left) look on.

locally imposed moratoriums on hunting. The Count Raggi's Birds of Paradise shown above displayed in a tree only 300 yards from a local village. The plumes these villagers use in their dances are from this same species but were collected years ago. The people tend not to kill birds that live near the village because they like to see them. But this informal conservation tradition is not universal in New Guinea, nor does it work in the face of intrusion by Western culture.

The introduction of shotguns poses a major threat to wildlife, including birds of paradise, near many villages throughout Papua New Guinea (firearms are not available in west New Guinea—Irian Jaya). Habitat destruction may be an even greater danger to these birds. Lumbering, mining and clearing for gardens and development means less space for wildlife in all forms. Although New Guinea remains relatively undisturbed in comparison to many of the nations of Southeast Asia, problems are on the horizon. The population growth rate is high now, and the demand for timber and mineral products by developed nations is growing. Whether the birds can survive this pressure will depend on strict observance of the conservation strategies drawn up by local governments and international agencies that oversee the preservation of habitats and wildlife. We can hope they do, so we—like the New Guinea villagers—can continue to see them.

In the "flower" display, a male Count Raggi's Bird of Paradise shows off his bright pectoral plumes.

The Pythagorean theorem illustrates an ancient belief that shapes, sounds, ideas—everything—could be expressed with numbers.



An Arabic explanation of the Pythagorean theorem, 1258 A.D. (Courtesy of the British Library).

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The radiance of Garbo gleams against darkness in Clarence Sinclair Bull's 1930 picture: "I never had to say 'Hold it' or 'Still, please,'" he once recalled. "All I did was light that face and wait."

Gods and goddesses in graven images from old Hollywood

A touring show presents striking pictures by a handful of portrait photographers who turned flesh into glamorous fantasy

Photographer Laszlo Willinger gets ready to shoot intensely-posed Ava Gardner at an MGM still session.

"When I think of Garbo," says early film star Louise Brooks, "I do not see her moving in any particular film. I see her staring mysteriously into the camera. . . . She is a still picture—unchangeable." Brooks is referring to the face of faces (opposite), beauty and gravity and an inner joyfulness blended in proportions that defy description.

Her sentiment, though, is shared by millions of people, and the object of their photographic affection is not only Garbo. In the depths of the Depression, partly to provide escape from everyday life, Hollywood was in the business of creating something called glamour. The word came from Scotland, where for ages it was connected with creating the illusion of beauty through a kind of unwholesome magic, often practiced, as Sir Walter Scott noted, by witches and "gipsies."

In the Hollywood of the 1930s much of the magic was worked by a half-dozen gifted studio still photographers—and their retouchers. They succeeded beyond all reasonable measure. The names and faces of a handful of stars live on in the mind's eye. Gable and Lombard. Harlow and Hayworth. Cooper and Crawford, whose face often seems a sculpted mask of tragedy. Robert Taylor and John Wayne. Not to mention Dietrich the peerless, infinitely desirable, and infinitely *désabusée*.

It did not matter that Gable had Dumbo ears. That Rita Hayworth's hairline was too low. That Norma Shearer had close-set eyes and Dietrich had stubby fingers. Studios and studio photographers could fix all that. They touched out cleavage, bloodshot eyes and body hair on all male chests, and eventually permitted stars no public smoking, drinking or domestic squalor. In order to have a free hand at creating perfection in publicity photographs, some studio still men had stars use almost no make-up when they posed. What all the subjects had in common was being photogenic. Given that gift, plus a screen test, any shopgirl could aspire to be a star: immaculate, remote, perfect. And rich. By 1936 Garbo was making $250,000 a film.

Despite their impact on the careers of stars, the men who worked the magic with their lights and lenses were for years all but anonymous. Studios simply gave their portraits away—free and uncredited. In recent years, though, the Hollywood photographers have been getting serious attention in shows organized by critic and author John Kobal, whose latest effort, *The Art of the Great Hollywood Portrait Photographers, 1925-1940*, will be at the Smithsonian's National Portrait Gallery until March 21. The show includes some superb and provocative portraits by, among others, George Hurrell, Clarence Sinclair Bull, Eugene Richee, Ernest Bachrach, William Walling jr. and the only woman studio photographer, Ruth Harriet Louise.

Kobal is a master of cinema lore, with a fine eye for the way photographic effects are achieved. But he is a romantic and a man as flagrantly star-struck as any male in the Western world. He insists that the "profound beauty" of these images "will cause them to live on like Raphael's Madonnas and Botticelli's angels." It is hard to go that far. But if it is the business of art to triumph over nature, Kobal has a point.

Timothy Foote

The two faces of Dietrich, one young and vulnerable (right), the other worldly cool, were taken in 1931 and 1935 by Eugene Richee and William Walling jr. Both pictures show influence of director Josef von Sternberg, who created Dietrich's screen image as a femme fatale.

The Evolution of Hollywood's "It" girl began (above) with Clara Bow, at 18, shortly after she won a screen test in a magazine contest. But in the 1926 portrait by Eugene Richee she has traded a tousled bob and five-and-dime impishness for a vampish look and a scarf.

"There were a million women waiting to see this picture," said Hurrell about flossy portraits—like this 1933 vision of Clark Gable—that many male stars, Gable included, regarded as "sissy." In 1937 (below) Laszlo Willinger gave Gable mussy hair and an anxious expression.

Contrasting Crawfords were photographed by George Hurrell. The first, an artful 1930 blend of angst and freckles, was calculated to win her emotional roles. Retouched portrait (right) made Aldous Huxley compare her to an as-yet-unnamed product by Du Pont.

Art triumphs over nature in William Walling's oddly touching portrait of Charles Laughton. Self-conscious about his looks, the actor often played grotesques.

A Rocky-like pose, in sweat shirt against a geometric backdrop, lends Ted Allan's view of heartthrob Robert Taylor an athletic look he lacked in real life.

Classic close-up (this one by A. L. Schaefer) makes viewer feel he can reach out and touch Rita Hayworth's perfectly glazed skin and gleaming hair. Originally a plump brunette, she was redone by studio, which turned her into a strawberry blonde and heavily plucked her hairline to heighten her low forehead. After films like *Blood and Sand* and *Gilda* she became the Love Goddess personified, even to marrying a prince—Aly Khan. But the role proved treacherous. Hayworth, recalling her botched marriages: "They all married Gilda, but they woke up with me."

In this startling image of John Wayne at age 24, photographer William Fraker makes the gruff cowpoke-to-be seem sensitive yet Mephistophelian.

Going for baroque to publicize Jean Harlow, Hurrell creates an elaborate confection of clasps, curls, contrasting lights and shadows.

Carole Lombard, by Eugene Richee, looked daring in 1932 because of cigarette and lighting that emphasized her legs and shoulders.

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By Andrea Oppenheimer Dean

Richard Lippold's wired universe of gold and silver

For more than 25 years now this artist has been busily embellishing public space with sculptures that almost want to fly

In his spacious studio, once a stable, Lippold's prized possession is an organ custom-made for him.

Two decades ago, when the idea of embellishing public spaces with large works of art was just beginning to take hold, Richard Lippold was the most sought after so-called architectural sculptor in New York, where the artistic pace was set. His piece of 1956, *Variation within a Sphere, No. 10: The Sun*, created a sensation. It was the first work by a contemporary artist ever commissioned by the Metropolitan Museum of Art, and it was dazzling. It resembles an intricate three-dimensional line drawing of gold wires, or the work of an indefatigable spider spinning a golden web (p.112). Twenty-two feet long and 11 feet high, it is made of two miles of 22-carat gold-filled wire and 14,000 hand-welded joints. It took three years to complete and was an instant media event in those premedia-event days. The critic Hilton Kramer, in *Arts Magazine*, called it a "very disturbing event . . . not sculpture but a kind of charade of sculpture which, while hinting at vast conceptions, makes its points very much as window decoration catches the eye."

Despite that magisterial opinion, *The Sun* was instrumental in winning a series of impressive additional commissions for Lippold, a number of them in important buildings designed by outstanding architects in New York City. Other commissions followed for major pieces across the country, including installations in cathedrals, and for new architectural centers in foreign lands. Nevertheless, Lippold slipped from the attention of what is known as the "art world." The art critic's beat, after all, is the gallery and the museum, not hotel and office lobbies. As Calvin Tomkins, author of a 1963 *New Yorker* profile of Lippold, said recently, "I lost track of him."

In New York's Park Avenue Atrium Building, Lippold's *Winged Gamma* glitters above vast lobby.

The same cannot be said of the millions of people in this country and abroad who, through the years, have been excited and enthralled by his spectacular constructions in public places. Most recently he installed *Winged Gamma* (opposite), a major work in New York City, and at the moment has a clutch of important new commissions.

These many years later, seated in the living room of his Locust Valley, New York, home, Lippold talks about his life and work with ease. He is low-key, tall and loose-limbed, has pale eyes screened by glasses, and a shock of silver hair. He looks far younger than his years; is annoyingly garrulous and knows it; friendly, yet wary; seemingly moody; certainly meticulous. His casual clothes are impeccable. The colors in his house —gray, ivory, rust, beige, brown—are variations on the colors of his sculptures, all of which are gold and

Lippold's gold-and-silver universe

silver. "I feel," he says, "a great dichotomy in my nature, so it is also in my work. My work is symmetrical because there isn't a thing that doesn't immediately suggest its opposite—clarity and obscurity, arrival and departure, joy and grief. There is always a balance, a pushing and pulling; things never quite meet or part. I use gold, which is warm; silver is cool. Gold is the oldest metal; stainless steel is brand new."

Lippold says that the idea of space as infinite, time as endless, is the key to his art—a feeling shared by others of his generation as the new science of the 20th century expanded outward into the universe. His love affair with space began, however, with the vast Midwestern prairies of his youth, which, he maintains, "many people find dull but are for me magnificent spatial experiences."

Orpheus and Apollo, 1962, graces the lobby of Avery Fisher Hall at New York's Lincoln Center.

As a young man, Lippold was torn between art and music as a vocation—he still plays the organ for pleasure—and his career as a sculptor began somewhat by accident in 1941. He had been trained as an industrial designer, worked at it for two years and then left Milwaukee to teach design at the University of Michigan. A colleague convinced him to enter a university art exhibit, and while weeding through and throwing out many sketches, "one caught my eye," Lippold recalls. "It looked more like three dimensions and I decided to make it into something." Out of newspapers and baling wire from the city dump, Lippold made his first sculpture. It was a collage of himself and Louise, a dancer whom he had married the previous year, with a newspaper headline about the attack on Pearl Harbor. "With that I got rid of the urge toward autobiography and social comment," he says.

Adjacent to the Lippold house in Locust Valley today is a huge studio, a converted stable. In it stands a magnificent organ designed by Lippold (p.109) and a 1925 yellow Franklin automobile, one of several of his antique cars. It is in this studio that he still works out his constructions, making what resemble architectural or engineering drawings (which he prefers to models as being a better way to work out stresses) as guides for cutting his materials to size, figuring weights, calculating strengths for attachment points and so on.

Lippold the Loner has always avoided attachments to groups. The years immediately following World War II were, of course, dominated by the Abstract Expressionists, America's first home-grown modern artists. Lippold neither joined them nor liked their work.

His first significant break came in 1950 when New York's Museum of Modern Art bought his piece *Full Moon* from a show at the Willard. The same year, Walter Gropius asked him to make a construction for the grounds of the graduate law school at Harvard. *World Tree* was not a great success. Tom Lehrer wrote a poem about it for the *Harvard Crimson*, which ended: "Of all the thoughts of Mr. Gropius,/ This cosmic hat rack is the dopius."

A commission to create The Sun

About three years later, Lippold was commissioned by the Metropolitan Museum to make a piece, *The Sun*, for one of its rooms. In a diary, the late Anaïs Nin wrote of falling in love with the work, which received enthusiastic praise from most critics. *The Sun* is now on loan to the National Air and Space Museum, where it is much photographed and admired.

Commissions also came to Lippold directly from architects Philip Johnson, Max Abramowitz and Walter Gropius. It may be apocryphal, but Gropius is said to have declared that only Lippold among ar-

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The extraordinary diamond of a carat or more.

Show the world you couldn't have made it without her.

A diamond is forever. De Beers.

Commissioned by New York's Metropolitan Museum, *The Sun* made blazing debut when installed in 1956.

chitectural sculptors really understood collaboration between architects and artists. To most architects, who want to control every aspect of their buildings, artists are mainly a nuisance. For their part, artists regard architects as meddlesome egomaniacs. "The artist and the architect in this country," says Lippold, "are both prima donnas, and trying to get them together to collaborate is very, very difficult. When I started to do it 30 years ago the art world said I'd gone commercial. Now everybody's trying to do it. Name me a sculptor today who doesn't want a commission with an architect. There's money in it [his pieces sell for $200,000 to $600,000] and prestige and visibility."

But, he laments, true collaboration has not existed since the Renaissance, after which the artists and architects went their separate ways. The artist, he says, "went into his private cellar and created his personal expressions; it became a neurotic thing, self-examination, self-confession." The architect, meanwhile, took pride in being hard-nosed, down-to-earth, a generalist and usually also a sculptor, if only of buildings.

Lippold recalls how one architect insisted upon revision after revision because he was afraid the sculpture might touch, and therefore blemish, his walls. And Lippold remembers discussing a project with Philip Johnson who, he says, ended their conversation by saying, "Richard, you just make pretty things and we'll find a place for them in our architecture."

Andrea Oppenheimer Dean, senior editor, articles, Journal of the American Institute of Architects, *wrote about Kevin Roche in* SMITHSONIAN, *August 1982.*

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The Four Seasons—it has been a great success ever since its installation in 1959 in the restaurant of that name in New York's Seagram Building—enlivens the air of the room. It is 11-by-22-by-22 feet overall.

That was not, of course, the procedure by which Lippold created his delicate, cloudlike hanging piece over the bar of Johnson's Four Seasons restaurant (above). Johnson considers it Lippold's best and is probably correct. About 22-by-22-feet square and made of 1,500 square bronze rods one to five feet in length, it floats serenely, shifting slightly in appearance—as might an Op Art object—as one moves from it. In a very unaggressive way, it gives definition to an otherwise open, high-ceilinged room.

Less successful is *Flight* at the Pan Am Building. The piece is highly metaphorical, the forms derived from shapes made by modern aircraft, except for a central sphere representing the world, from which radiates a seven-pointed star. With its threadlike veils of gold wire and central orb all strongly lit for emphasis, one expects when looking at it to hear the stentorian opening bars of Richard Strauss' tone poem *Also sprach Zarathustra*. It creates a mood in sharp contrast to the businesslike and banal space it inhabits. Illustrative decoration? Probably.

Orpheus and Apollo at Lincoln Center is quite different. As one rises to the second-floor lobby by escalator, there appear segments of architectural bronze sheeting of different lengths, grouped and angled in varying ways, suspended from stainless-steel cables (p.110).The piece looks as though shot from a cannon at the top of the escalator. It is composed of two somewhat figurative forms that reach from the ends of the almost 200-foot-wide lobby toward each other near the center, where they approach but do not touch the uppermost balcony. The push-pull of elements—never quite meeting, nor yet parting, a quality that Lippold says characterizes his work—is especially evident here.

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Poised as if about to take off is this model for sculpture commissioned by the Deutsche Bank in Frankfurt.

Unlike *Flight, Orpheus and Apollo* seems without metaphysical pretensions, and complements while enlivening its space.

Ironically, Lippold, who decries trends and fashions, has a sculpture not only in the first of the group of recent multiuse arts centers, but also in architect John Portman's first hotel, progenitor of recent atriums in hotels and office buildings across the land. For these huge spaces, Lippold's soaring constructions seem ready-made, in part because of sheer size.

Orpheus and Apollo, though narrow, covers almost the entire length of its lobby. Another major piece, installed in 1966 at Jesse H. Jones Hall for the Performing Arts in Houston, is 52-by-92-by-80 feet. Called *Gemini II,* it looks like two flashing, bolting elements and is made of thousands of polished-aluminum rods suspended from strands of gold-plated cable. The sculptor's next commission, in 1967, was from St. Mary's Cathedral in San Francisco, designed by Pietro Belluschi and Luigi Nervi. This was for a baldachino, a canopylike structure over the altar. The work hangs 100 feet high, is made of thousands of short rods of aluminum suspended in tiers by a complex of thin gold-filled wires, and resembles a gently falling shower of silver (opposite). It is in constant hypnotic motion.

Among Lippold's important commissions after St. Mary's were Portman's Hyatt Regency in Atlanta (1975) and the National Air and Space Museum (1976). The latter was custom-made for Lippold, who regards the conquest of space as the greatest achievement and challenge of the 20th century, and whose every work expresses flight—things floating, soaring, gliding. *Ad Astra* is one of few standing sculptures by Lippold and is the tallest in the nation's capital.

There were in the 1970s, also, commissions for a shopping mall in South Carolina; a conference center in Riyadh; an airport in Iran; a casino in Kish Island, Iran; another Hyatt in Milwaukee.

He has been continually busy: most recently he installed a new piece in New York at the Park Avenue Atrium Building and it is his largest and boldest yet. *Winged Gamma,* suspended from the ceiling of a 21-story office-building atrium lobby, is 224 feet long, 20 feet wide and weighs three tons. It consists of two huge winglike forms elaborately made of segments of gold-anodized aluminum rising from a stainless-steel ladder-like structure which soars nearly to the full height of the atrium space.

Winged Gamma is only the first of an abundant new crop of his sculptures. He is making two pieces for buildings by Minoru Yamasaki in Japan; one for a 12th-century Romanesque cathedral in Viterbo, Italy; another for a corporate headquarters building in Dallas; and still others for the Alcoa headquarters in Pittsburgh, an office building in Boston and Deutsche Bank in Frankfurt, Germany (left).

One significant aspect of Lippold's success is surely that his work is emotionally accessible, never difficult or obscure, and most people find it simply lovely and intriguing to look at. I hope that even as his commissions increase in size and number, leaving less time for each, his work will retain these qualities. For, as one art editor said recently, "His sculpture gives me a feeling of joy, and I'll settle for that anytime, whether it's decoration or high art."

Richard Lippold's sculpture forms an ascension of light over altar of St. Mary's Cathedral in San Francisco.

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Courtesy of U.S. Coast Guard Museum

Formal portrait of Healy, with his parrot "Polly" on deck of the cutter *Bear*, was painted from photograph taken at the height of his fame in 1889.

By Mary and Albert Cocke

Hell Roaring Mike: a fall from grace in the frozen North

Coast Guard's Michael Healy was a hero in Alaska until he ran afoul of fate and the WCTU

"A melancholy case," declared the defense attorney in the court-martial of Michael Healy. If his client were convicted, Barclay Henley told the jury, the case might be "as melancholy as any recorded in the naval or military annals of our country."

The year was 1896. The place was San Francisco. Healy was captain of the U.S. Revenue-Cutter *Bear*, a man renowned from San Francisco to the Arctic Ocean and indeed the whole of the United States, for skill and selfless courage. He stood charged with gross irresponsibility and scandalous conduct. His attorney feared that conviction would efface a lifetime's record of heroic service, and at one stroke make Healy the very emblem of tragedy—a hero brought low by his own ambition, drink and the machinations of lesser men.

The captain was found guilty. And his case in some ways justifies lawyer Henley's rather grandiose prediction. Few people in the United States have ever heard of Michael Healy. No ship of the U.S. government service has ever been named after him and no prominent landmark, even in the vast, cold territory that for nearly 15 years was virtually his personal domain. Yet the story of Michael Healy's now forgotten exploits, and of his

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fall from grace, is a very remarkable chronicle.

Healy was the son of a slave. His mother, a mulatto woman named Elisa Smith, was the property of Michael Morris Healy, a Georgia plantation owner. Together they had ten children. When Michael and Elisa died—she in May 1850, he just three months later—they were buried together, side by side, in the family plot. Healy was of Irish blood, a man with a temper and a strong mind, as well as a Catholic who read widely—Gibbon and Milton and Shakespeare and even Thomas Paine—in addition to raising cotton and corn on a 1,600-acre plantation not far from Macon. What duties Elisa had, other than bearing children, is not known. But she lived with Healy as his wife and to judge by their offspring, they were a remarkable couple. Until about age ten the children were kept by the father on the plantation. But knowing that because of their mixed blood they would be regarded as slaves if he died, the elder Healy sent them North, one by one, while they were still small, to be educated in first-rate Quaker and Catholic boarding schools. Thereafter, some passing for white and some not, most of them made a mark in the world.

Of Michael Healy's brothers, one became a bishop, another a doctor of canon law. From 1873 to 1882 Patrick was president of Georgetown University in Washington, D.C. Three of the girls became nuns, one ending her career as a Mother Superior.

Michael, born in 1839, lost his parents when he was only 11. By the time he was 15 he had run away from three schools, in Massachusetts, in Montreal and finally in Paris. With characteristic resourcefulness, when fleeing the last school he anchored his escape rope to a statue of the Virgin Mary, and so got over the wall. In 1855 he found a berth as a cabin boy.

Albert Cocke and his wife, Mary, granddaughter of Capt. David Jarvis who served on the Bear, *are writing a biography of Michael Healy.*

Rescued seaman J. B. Vincent is pictured after being saved from Siberia by Healy.

By age 24 he was an officer on a merchant vessel. At the end of the Civil War, he joined the Revenue-Marine, a precursor of the U.S. Coast Guard, then administered by the Treasury Department. In 1868 he made his first cruise to Alaska. Tough, exacting, possessed of explosive energy and a savage temper, but also considerable discipline, Healy was a born sea commander. By 1883 he was already something of a legend, a full captain in the Revenue-Marine, in charge of the cutter *Corwin*, still serving in the far North. In 1885 a Congressional citation praised "this gallant officer and his brave associates . . . for their heroic deeds" in Alaskan waters.

Along with the citation, Congress noted that the territory of Alaska, purchased from Imperial Russia in 1867, contained nearly 600,000 square miles and had 20,000 miles of coastline, "twice the extent of all other coasts of the United States." In this harsh territory lived 20,000 Eskimos and Indians, nearly 1,000 Aleuts, a few hundred whites. Each summer

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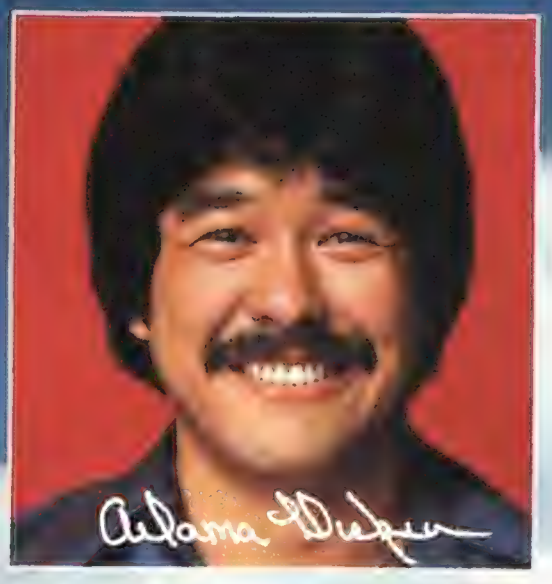

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perhaps a thousand transients as well —whalers, sealers and fishermen— sought their fortunes in the North. "For protection of these important possessions . . ." it noted, Congress provided one revenue ship. That ship was Healy's command.

There was territorial government, of course, established in southeast Alaska. But most of the territory was left to the protection of the small, 137-foot *Corwin*. Based in San Francisco, she patroled the Bering Strait and the ice-haunted northern passages from the Aleutians to Point Barrow. Her decks were often crowded with people: natives caught away from their villages by storms, shipwrecked sailors, destitute miners, missionaries and scientists sent North under Healy's care to do field research.

Healy had to cope as best he could with the illicit sale of liquor to Eskimos, and try to keep the insatiable sealing industry from slaughtering animals off limits and out of season. The continual state of emergency that was called "the Arctic station" thrust Healy into the role of rescuer, protector, judge, jury and sometimes executioner of justice.

One year after the Congressional citation, Healy received a larger ship, the *Bear*. Already famous in the North for helping save the remnants of Lt. Adolphus Greely's polar expedition in the Canadian Arctic, the *Bear* was sturdily built, barkentine-rigged but with a powerful engine as well, and a hull specially sheathed in ironbark. She was ideal for Healy, who burned to show the family that he, too, could rise in his chosen profession. With advancement in mind he was sometimes inclined to boast about his accomplishments. On a trip to the East in 1889, for instance, he was interviewed in New York "attired in a well-fitting suit of dark, fashionably cut clothes, with a Chesterfield overcoat and Derby of the latest pattern." He stated that he had brought down more than 300 shipwrecked men from the Arctic, adding, "The

With *Corwin* lost in a mountain of ice, crewmen have gone "ashore" in order to collect snow to boil for fresh water.

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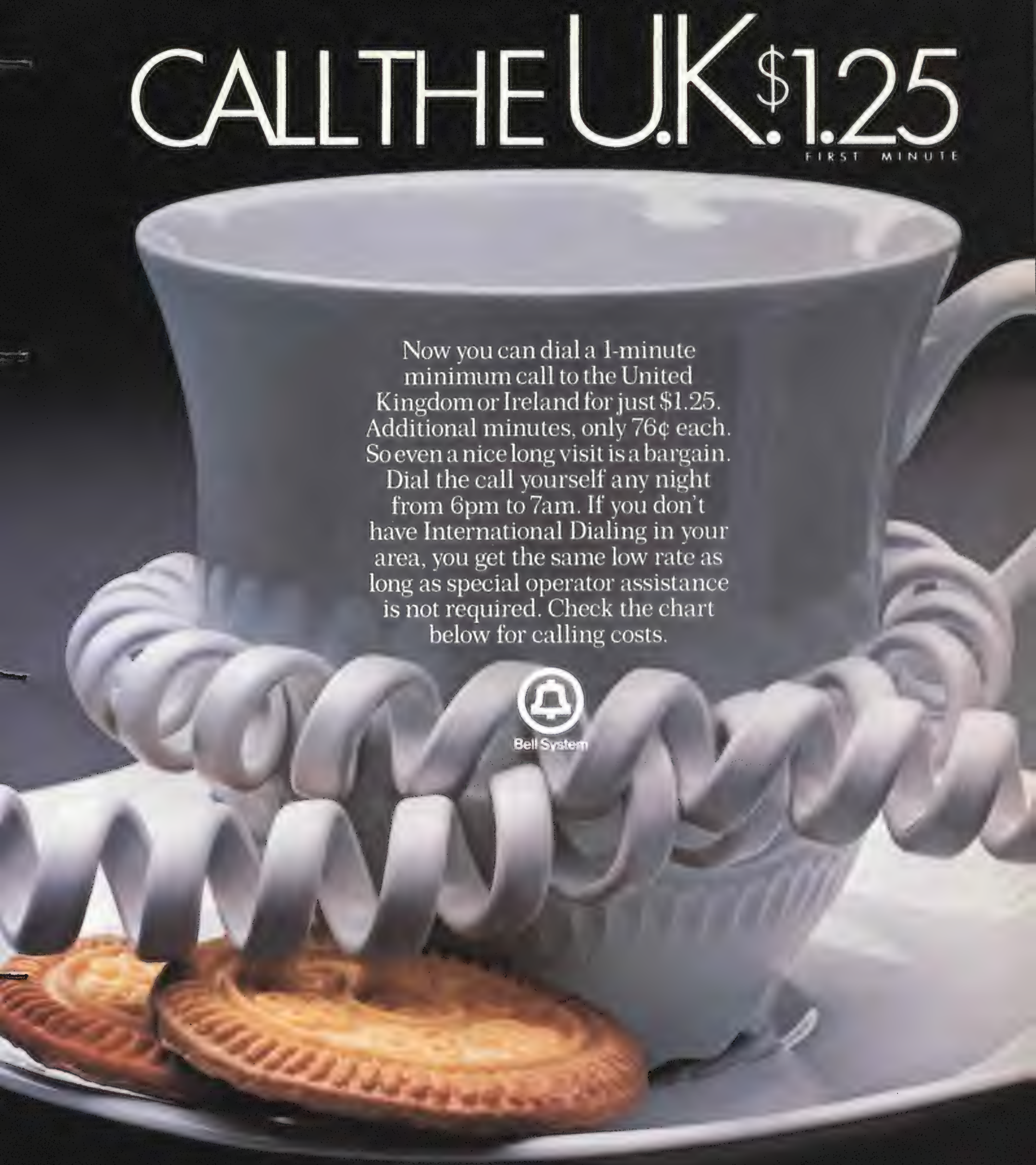
Eskimo family visited the *Bear* at Cape Prince of Wales, Alaska. Healy tried to improve their lot by importing reindeer from Siberia.

vessels I have hauled out of the ice and off the beaches would . . . run the Revenue-Marine Service for the next four years." Such remarks made good copy. But they certainly did not endear the captain to officials back in Washington.

By that time Healy was already famous for finding a castaway seaman, James B. Vincent (p. 120), long after he had been given up for dead. In 1888 Healy had also driven himself and his crew beyond the call of duty in an incredible mass rescue. That year the Alaska whaling fleet anchored behind the bar at Point Barrow, to ride out a gale blowing up from the southwest. Then the wind veered to the north. Mountainous waves began to break over the bar—a bleak sandy spit in the shape of a question mark, jutting into the Arctic Ocean. A civilian passenger on the *Bear* described what followed:

The schooner *Jane Gray* parted her cables and drifted against an iceberg—knocking a large hole in her side. She filled rapidly and sank, the crew taking to the small boats. The next to slip her moorings was the bark *Phoenix*. She struck the bar and sunk. Her crew drifted about in small boats for six hours, in that terrible storm, before they were picked up. Then the barks, *Mary and Susan*, and *Fleetwing* went on to the bar and pounded into pieces.

As the ships broke up, the crews scrambled wildly in the ice-filled seas. It was a terrible time to lower rescue boats—but under Healy's direction the crew launched boats and began to haul drowning men out of the water. When the storm blew itself out, 160 rescued men were on the *Bear*. Back in San Francisco, the press pro-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claimed Healy's exploit an epic of the North, and called the captain a man "daunted by nothing."

But exactly as classical tragedy would have it, precisely at this moment of triumph the fates dealt Healy his first blow, foreshadowing difficulties to come. It came from one of the strangest coalitions imaginable. The Woman's Christian Temperance Union and the Coast Seamen's Union joined forces to denounce Healy as a drunken monster whose atrocities aboard ship outrivaled those of the Spanish Inquisition.

And so, in February 1890, Michael Healy's first court-martial, or "investigation" as it was officially called, convened. Healy was accused of being drunk on duty and of "tricing up" mutineers on whaleships—and other vessels—after being called in to enforce discipline by merchant captains afraid of unruly crewmen.

A triced-up man's hands were manacled behind his back. Then he was pulled up by a rope fastened to the manacles and run over a beam, until his toes barely touched the deck. A surgeon testified that while the pain would be agonizing, the punishment probably did no permanent damage. The protesting seamen agreed with the WCTU that the only explanation for such unwarranted and brutal conduct was Healy's almost continual state of intoxication. Mrs. Mary B. Eden, the WCTU representative, asserted that Healy must have been "dreadfully drunk on each occasion" in order to commit these fiendish deeds. Unfortunately for the prosecution, the WCTU's chief witness, Seaman Henry Spicer, was discredited because he admitted stealing a revolver from the ship's armory.

Healy admitted that he triced up mutinous seamen, not in anger, but simply to frighten them into obedience. "There was no Deputy Marshall or other officer. . . " he told the court. "I was the only representative of the United States . . . I felt myself compelled to act." As he described the behavior of the men whom the WCTU called "inoffensive" sailors, he repeated some of the language they had used addressing their captains, officers and himself. The women at the trial were so deeply affronted they immediately wrote an angry letter to the Secretary of the Treasury charging that Captain Healy could be arrested for "committing such obscenities in a public place." And, as Mrs. Eden fumed, the court "never rebuked him in any way whatsoever."

The trial was a serious matter to the whalers, however. Their lives and property often depended on Healy's presence in the Arctic. Their letters and testimonials praised Healy extravagantly. Said the Master of the bark *Andrew Hicks*: Captain Healy "could not be replaced by anyone in the Service for this particular duty which is one of great danger at all times." The trial made clear, too, that drink had not impaired Healy's skill as a ship's captain. One of the whaling captains could not resist a parting

Dr. Sheldon Jackson, in Eskimo garb, was partner in the reindeer project.

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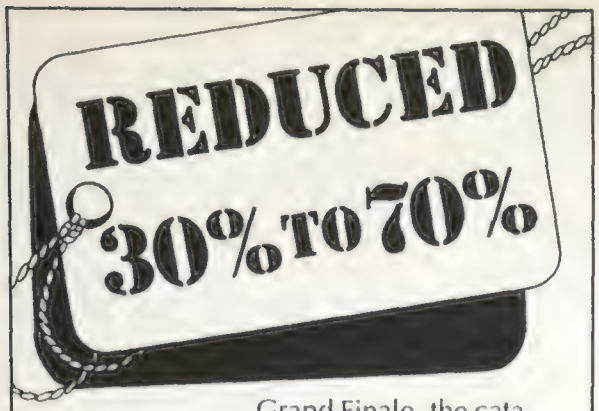

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shot at the WCTU ladies. Describing a feat of shiphandling by Healy on the very day he was accused of being drunk in Unalaska, the captain concluded, "If it takes a drunken man to do that, a man better get drunk."

The Board found Captain Healy's disciplinary actions entirely justified and the evidence overwhelming as to his sobriety on duty. Yet the trial must have frightened Healy for, like everyone else in the North, he drank. Being of great physical strength and discipline, Healy probably could hold his liquor. But ashore, freed of the grip of command, he acquired the name of "Hell Roaring Mike" because of his heavy drinking and choleric language. He worried enough about it to encourage his Boston Irish wife, Mary Roach Healy, to sail with him so she could help keep him off the bottle.

The American press now declared that, from the Mackenzie River to the Pribiloffs, Healy was "a beneficent providence" to the desperate and destitute, "an avenging Nemesis" to the criminal element afloat.

Many of the "criminals" were traders who sold liquor to Indians and Eskimos. The "desperate and destitute" were the people they sold to. Eskimos were not citizens. By the 1880s, with whaling, sealing, fishing and the whiskey trade solidly established in the North, the days of tribal peoples seemed to be numbered.

European diseases and starvation were notable dangers to 19th-century Eskimos. But so was whiskey, and the traffic was hard to control. Talking to a New York *World* reporter about an 1880 visit to St. Lawrence Island, Healy said: "We found a horrible example of the effect of the illicit trade in whiskey. Out of 700 inhabitants, over 500 were found dead of starvation. The whiskey, which was smuggled into the island from San Francisco and the Hawaiian Islands, made the Indians so improvident that they failed to lay in their usual stock of provisions."

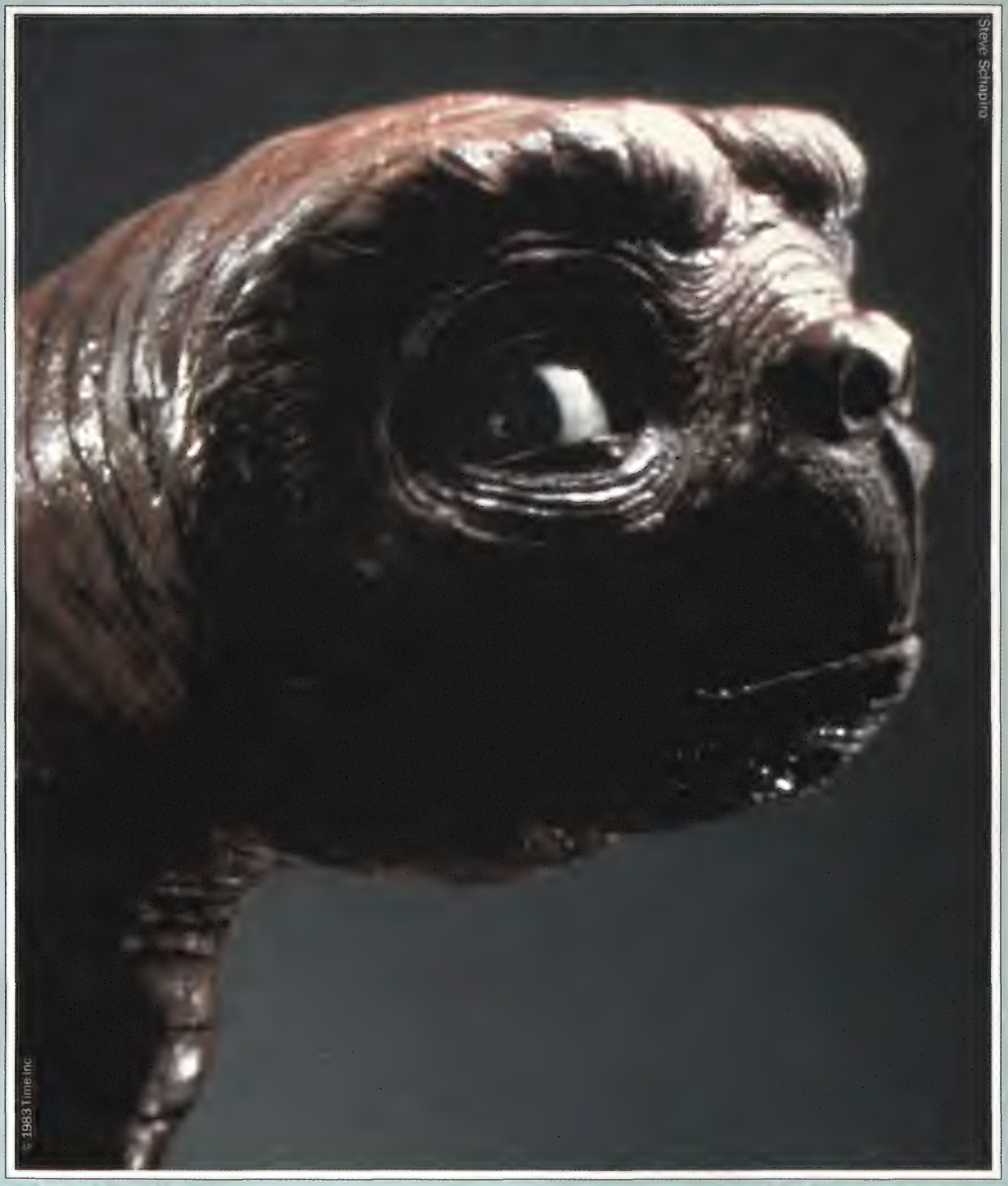
Michael Healy now joined in an extraordinary program to help the natives. Throughout his career he was very guarded about any suspicion of his own racial origin, keeping his wiry hair close-cropped and wearing a large mustache that tended to hide his features. Like the Eskimos and Indians, though, he was of a minority race. He was also an angry and voluble champion of the other underdog groups to which he belonged, speaking out fiercely whenever Catholics and the Irish were slurred, as they often were in 19th-century America.

Healy had noticed that Eskimos on the Siberian coast were much better off than the Alaskan natives. The explanation, he found, was that they kept herds of domesticated reindeer that provided clothing, shelter and food to tide them over when fishing and hunting were poor. Healy believed that reindeer, which were similar to the wild caribou in Alaska, could be raised there too, since the same moss that fed them grew on both sides of the Bering Sea. In the years between 1892 and 1895, he allied himself with an energetic Alaskan missionary, Dr. Sheldon Jackson (p. 126). The rough sea captain and the evangelist badgered philanthropic Presbyterians and a reluctant Congress until they raised enough funds to import a herd of reindeer, plus herders to train the American Eskimos in their care. Then, a few at a time, Healy ferried 500 reindeer over from Siberia to Alaska on the decks of the *Bear*.

The experiment was not entirely successful. Siberian herders grew homesick. (Jackson eventually went to Lapland to obtain replacements.) Many natives on the Alaskan side preferred being hunters, not herders. Domestic reindeer interbred with wild caribou. But many reindeer herds grew and multiplied. (By 1904 Sheldon Jackson could report that there were more than 8,000 reindeer in Alaska.)

According to the newspapers, Healy was now better known in the Arctic

HUMAN



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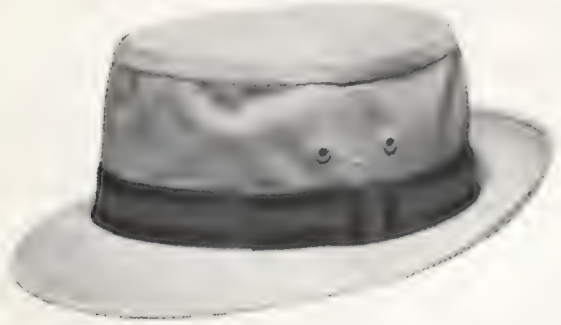

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than the President of the United States. As with many other men in the northern service, though, the strenuous life began to tell on the captain of the *Bear*. By 1890, age 51, he noted with dismay that he was having difficulty making the straight climb 125 feet to the crow's-nest lookout. Damp, cold and snow were his constant companions. "My mind is so occupied and engrossed with the care of the vessel," he protested, in a report to Congress, "and my system so burdened by fatigue and exposure . . . that I am wholly incapacitated" to attend to other matters.

And then there was the ever-present Arctic fog: "thick, enduring, obstinate, exasperating," as Healy described it. When it closed down upon a convoy of ships, they disappeared as if by magic, although ghostly conversations still drifted across the water. Sometimes the only warnings of a rocky shore near enough to cripple a ship were birds' cries from the isolated Arctic rookeries.

Masters and crews also lived in constant fear of ice. Wind and current-driven floes could disembowel a ship or pinch in her sides. They could raise her up, pass underneath, taking off the rudder or even the keel, and punch a few holes in the hull for good measure. In the spring the ice cover weakened, exposing tricky lanes of clear water. Through these the whaling fleet recklessly plunged, following the whales. Behind them came Healy and the *Bear*.

As he got older, Healy grew more and more short-tempered and intolerant of mistakes. Even in good weather, death at sea could come unexpectedly—a sudden deep roll of a relatively calm ocean and a sailor at the masthead plunged into the water, like Icarus, and was gone. A

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ship's boat would overturn in the surf, and the bodies of its crew would be tossed up on the sand like pieces of driftwood. Healy fumed about carelessness and savagely drilled his boat crews, for he was the one who read the burial service.

He was sent young officers to train and increasingly they resented his harsh seaman's discipline. Many now came from the new Revenue-Cutter Service Academy and had more formal education than their captain. Although he read widely, Healy had little patience with the results of classroom instruction. He was known to have crumpled and tossed overboard a reckoning made by a young lieutenant who had misjudged the tricky Arctic currents: "Where would the vessel be, sir, if we used your positions?" "Eight or ten miles inland, sir," the shamefaced officer had to admit. But such exchanges, though they are the stuff of legend, did not endear him to the victims. In the wardroom, complaints began to circulate, for the new men felt they were being unfairly harassed.

It was on his 22nd Arctic cruise, in 1895, that the fates again beset Healy. He had a young ship's doctor aboard who did not know the North, and a sulky batch of new officers. Mary was not along, and Healy went on board with a bad case of the flu, at that time called "La Grippe." The doctor, Thomas Bodkin, prescribed whisky and quinine three times a day. To his dismay, he soon noticed that "one drink of any high liquid shows very perceptively on Captain Healy." Healy became aggressive, insulting and profane. The younger officers began to complain that the captain was always drunk. Dr. Bodkin noted that his patient was taking more whisky than he had prescribed, and appealed for help to Lt. Albert Buhner, the second-in-command. "We all drink," Buhner said. Then he simply removed a case of Scotch Highland whisky from the captain's cabin.

Healy's disposition improved rap-

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idly. But when the *Bear* joined the whaling fleet at Icy Cape, there were drinking parties given by the whaling captains, and Healy's abusive language began again. At the same time, he was trying to set such strict standards for the less competent of the young officers that they found his demands impossible to meet. Led by Lt. George Daniels (right), who had been reproached for overturning a small boat, they rebelliously conspired to "keep book" on the old man and get even with him.

According to testimony from investigation records, when the fleet reached Unalaska Healy was invited to a smoker aboard a British naval vessel. There, the young officers later claimed, he behaved "loutishly." Interpreting some remarks by the British captain as a request to get Healy back to the *Bear*, they clustered around him, begging him to leave. Healy grew so angry that he sprang from his chair, lost his balance and toppled over, grasping a brass rod that held a lamp. Next day he fell off the dock and had to be hauled out.

Also aboard the *Bear* during the voyage was Dr. Benjamin Sharp, a supercilious young man from the Academy of Natural Sciences of Philadelphia. Sharp shared the captain's cabin, an arrangement not uncommon for distinguished passengers. Healy soon thought Sharp an arrogant young fraud; Sharp soon considered Healy an uncouth brute. Healy accused Sharp of taking some trading goods from ship's store. He was also accused of using ship's boats without permission. Finally, Healy heard that Sharp had called him "a Goddamned Irishman."

Confronting Sharp, the captain seized a huge mastodon tusk that was in the cabin, raised it above his head, and stepped forward. Sharp said coolly, "You had better put that down on the table." Healy threw it on the table, noting that it could smash a man's head. "It would if it hit him," Sharp said with great sangfroid.

George Daniels, Healy's accuser, was shown in newspaper sketch at 1896 trial.

After the *Bear* quit the whaling fleet and proceeded southward toward San Francisco, the captain's drinking decreased and his normal manner returned. He parted company with both officers and crew on reasonably amicable terms, even with Dr. Sharp, to whom he presented several handsome furs and pieces of native craftsmanship. It seemed that the fates had failed, that Healy's binge afloat might pass unnoticed.

But Daniels had already written a formal letter requesting a court-martial to investigate his behavior in Unalaska. Daniels accused Healy of scandalous conduct and of being so drunk he could not safely navigate his ship. Protocol required Healy to forward the letter to the Chief of the Revenue-Marine on reaching port. On Thanksgiving Day, according to his version of the story, Healy called the lieutenant to his cabin, dressed him down about some unfinished duty, and spit on the floor, saying, "Mr. Daniels, you disgust me."

According to Daniels, who had sta-

Portrait of Michael Healy was made about 1880, when he was a junior officer.

tioned some of his cohorts outside the door as witnesses, "He looked at me for a second and then spit in my face, and then he ran towards the back of his room. I said, 'What do you mean, sir, by spitting in my face?' The Captain said, 'You are a liar.' I told him I would telegraph to the Department about this [drunken] condition, and prefer charges against him." The telegram was sent. Healy was relieved of his command by return telegram.

At the court-martial that followed, the charges were: insulting, tyrannous and abusive conduct to inferiors; placing a government vessel in a perilous position when intoxicated; and drunkenness to the scandal of the Service. Healy denied them all. They were, he insisted, magnifications of isolated incidents. To the newspapers he said "this whole thing is a put-up job by a few young fellows who don't want to work and hated to obey. And then I suppose the boys think the old men ought to get out of the way and give them a chance." He admitted that he had "probably" taken

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more to drink than the doctor prescribed. The *Bear*'s crew, to a man, testified that the captain was always sober on duty. So did the whaling masters. Lieutenant Buhner testified that, despite his drinking, the captain was always able to perform his duties.

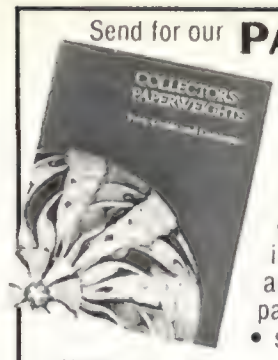
Dr. Sharp was the last prosecution witness. He said he could smell alcohol in the cabin and hear it being poured. He noticed the captain's speech thickening, his gait progressively unsteady. "And," said Sharp with disdain, "I saw him mixing his potatoes and gravy with his fingers, and feeding himself . . . with his fingers." At that point, a newspaper reported, the defendant shouted, "That is false as hell!" and sprang to his feet. "His eyes blazed with passion . . . then he stepped back as if ashamed."

The testimony of the younger officers had been extensive. Evidence that they had shown hatred, collusion and conspiracy was never permitted to be introduced. Dr. Bodkin, the unfortunate physician who had prescribed whiskey as the captain's cure, was appalled by the unfairness of the proceedings. In a special hearing he asserted that Lieutenant Daniels was himself a drunk, and a jealous incompetent as well. But the testimony against Healy was too complete to shake off.

The Revenue-Marine, however, did not summarily dismiss him. Instead, Secretary of the Treasury Carlisle placed Healy at the bottom of the list of captains, suspended him from command for four years and had him publicly reprimanded.

Michael Healy might have sat on the beach forever had it not been for the Nome Gold Rush. By 1900 more cutters were needed in Alaska. When another Revenue captain died unexpectedly, Healy was given command of the new cutter *McCulloch*, and once more he was dispatched to the North.

The fates were not through with him, however. As he was returning



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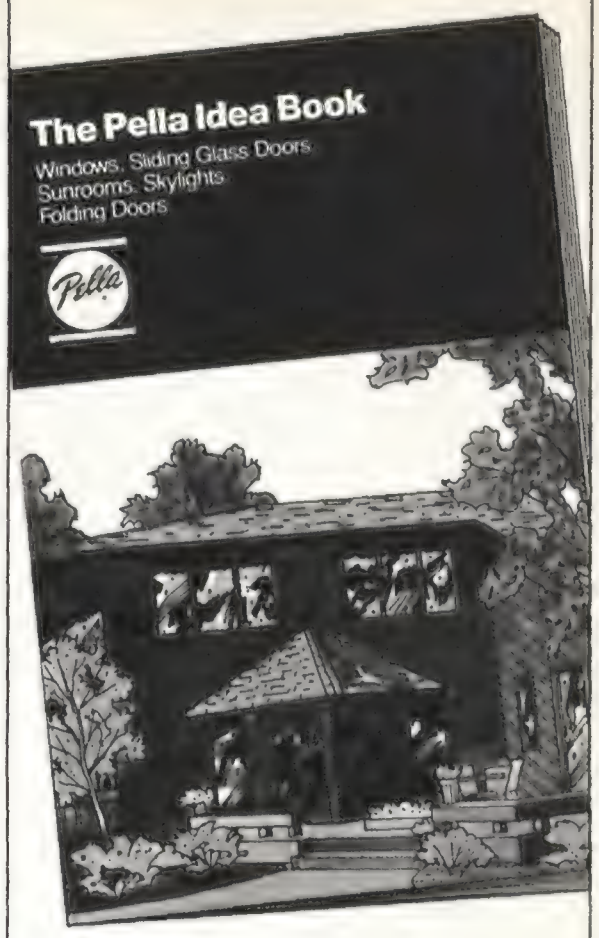
from Nome to Unalaska, he got word that he was to be transferred to the *Seminole,* a small cutter in Boston Harbor. It was a position similar to the one he had had as a lieutenant 25 years earlier. Three days at sea out of Unalaska, he turned to a startled female passenger, politely said "Goodbye, madam," and started to climb over the rail. Quick-thinking officers and crew caught him, hauled him back. During the night he somehow managed to cut his wrist with the crystal of a watch. To protect Healy from further shame, the executive officer threw his bloodstained mattress, sheets and blanket over the side.

Even then, the ever faithful whalers did not give up on their lost hero. While Healy was recovering in San Francisco, they fired off a final missive to Lyman Gage, the new Secretary of the Treasury, petitioning him to reinstate the captain, and adding: "If it were possible to circulate this petition among the dark-skinned subjects of the Government of the Far North we feel that no name would remain unattached."

In 1902, with a new administration, Healy's case was reviewed. Superiors decided that he had been dealt with too harshly and he was restored to his original rank, given command of the *Thetis,* an old but well-known cutter, and returned to the Alaskan station. He continued as captain for two more years, until mandatory retirement at age 64. A year after retirement, the bell of St. Mary's Church in San Francisco tolled for Healy's requiem mass. Flags flew at half-mast. The officers of the Revenue-Cutter Service turned out in gold braid. *Bear* crewmen carried his coffin.

If some of the natives of Alaska paused to mourn him or recalled the best-known name in Alaskan history, it was not for long. Gold had brought a swarm of government employees and services to the Arctic. The Hell Roaring Mike who alone had been responsible for an entire territory was already a figure of the past.

With kedge lines out fore and aft, the trapped *Bear* tries to work her way out of an ice pack. Cutter *Corwin* is in the distance.



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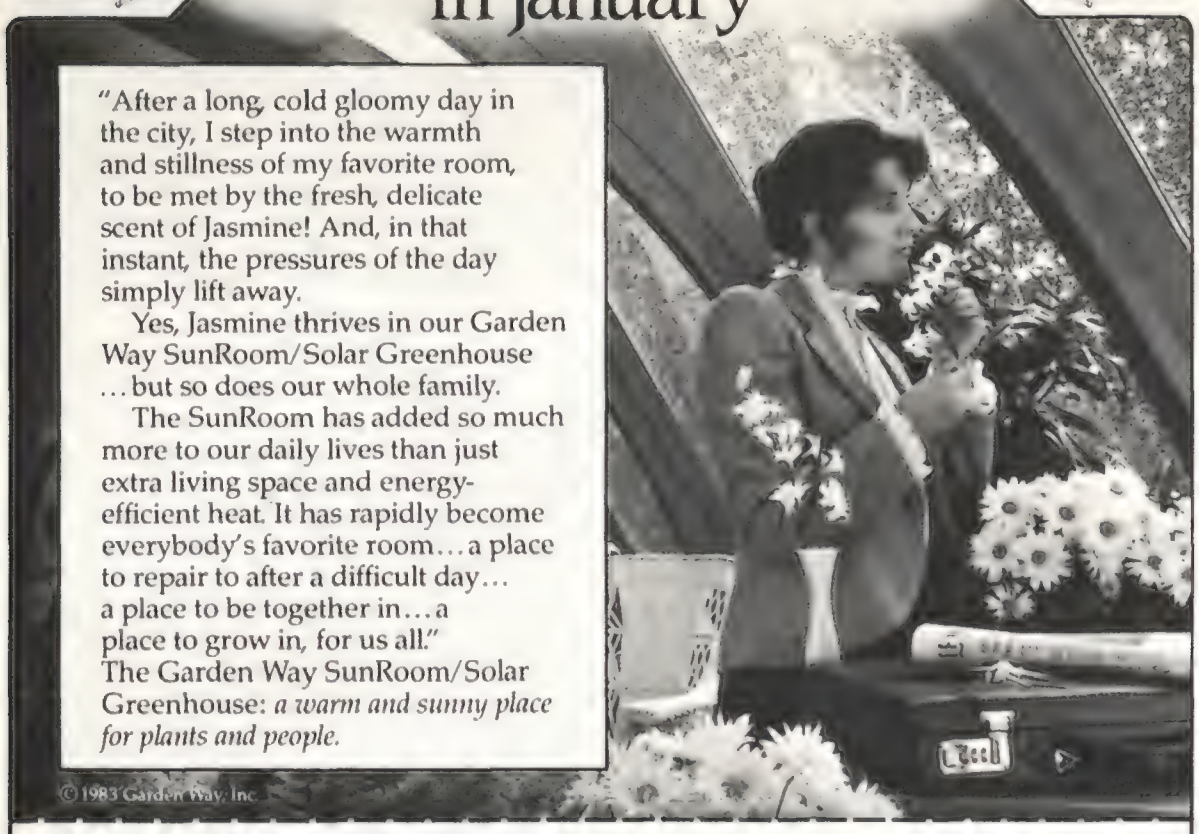

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Book reviews

The Farming Game
Bryan Jones
University of Nebraska Press, $15.95

There seem to be two voices speaking for rural America that people usually hear. One is the bland official voice of agribusiness and the Department of Agriculture. It's generally saying something boring about improved crop yields or economies of scale. The other is that of the rural counterculture. This voice is lively but not really very rural. It may come from the young heir to a city fortune who has become an ardent organic farmer on 30 acres in Wisconsin, and loses money every month; or from a Barnard College dropout who is living in Coos County, New Hampshire, and milking six goats by hand.

Bryan Jones is that rare thing, a real farmer who also writes. *The Farming Game* is the one book I've seen in the past ten years that I would give to someone who was thinking of moving to the country and actually supporting himself or herself off the land. (If I were feeling lavish, I'd throw in Wendell Berry's *The Unsettling of America* and Mark Kramer's *Three Farms*.)

I have several reasons. One is that I could be sure the book would get read. Anyone who picks it up will continue. They'd continue because they couldn't stop laughing. First at the dozen portraits of different types of farmers—the big-machinery addict, the bargain-snapper at livestock auctions, the experimentalist—that make up the first section of the book. Then at various barbed asides in the three long essays on how farmers can and do make money, which compose most of

the second section. Jones has a wicked wit.

My second reason is that the book is remarkably educative. Mixed with the humor is a mass of information and analysis. Jones understands the full complexity of farm finance. He has strong views about the "green revolution" and its costs to farmers here and in the Third World. He knows what the government is up to (no good) in the U.S. Meat Animal Research Center in Clay Center, Nebraska, with its approximately 40 scientists and 250 support personnel. He even knows the difference in taste between Jersey and Holstein milk, not to mention when it makes sense to keep Jerseys and when Holsteins.

My third reason is the book's hard-nosed realism. If Wendell Berry writes the poetry of farming, Bryan Jones writes the prose. Or if Berry is sometimes quixotic, Jones has more in common with Sancho Panza. Berry can say with some eloquence what is morally and spiritually wrong with agribusiness. Jones can explain its tax basis, and then go on to show how an independent farmer can weave in and out around the big corporations and make a buck. Even several bucks.

The book does have flaws. It sometimes descends to easy caricature. It is largely focused on what Jones calls the High Plains—the sweep of country from Oklahoma north to the Dakotas—and some of its insights would be of very little use to a farmer in Alabama or Ohio. Occasionally, too much else is sacrificed for a good wisecrack. But the reality of farming is here as other people very seldom see it.

Noel Perrin
Author of *First Person Rural*
and *Second Person Rural*

The Icon
Kurt Weitzmann, Gaiané Alibegašvili, Aneli Volskaja, Manolis Chatzidakis, Gordana Babić, Mihail Alpatov and Teodora Voinescu
Alfred A. Knopf, $60

Most people, I imagine, think of the icon as a small panel-painting of a sacred image held in reverence by members of the Eastern Orthodox Church, especially Russians. While the popular conception of the icon includes nothing grievously untrue, it is, as this handsome volume makes clear, far too limited in scope. In the book's introduction, which traces

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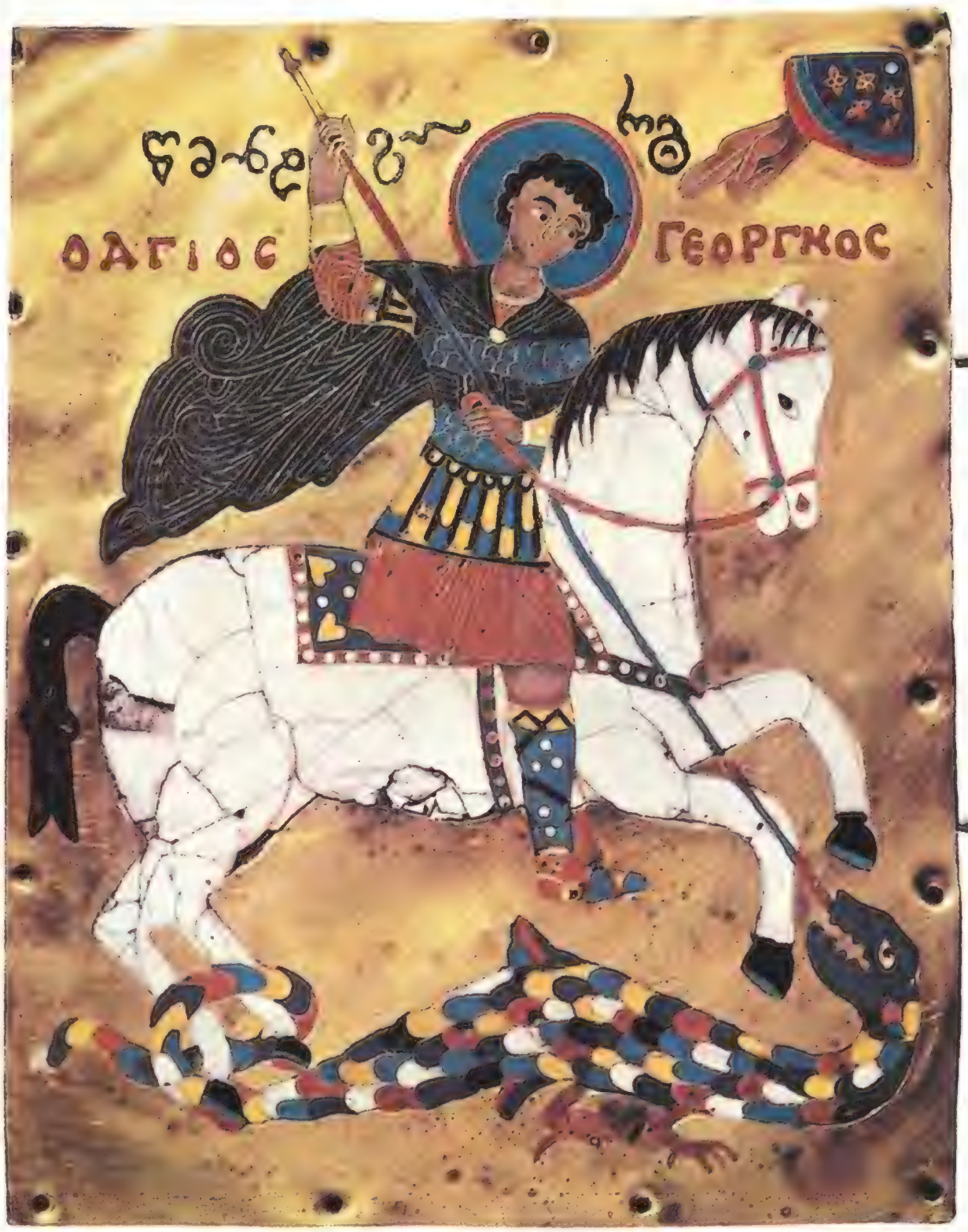
with admirable vividness the origins and development of the icon, Kurt Weitzmann of Princeton University rightly emphasizes the fact that, especially in the first several centuries after the advent of Christianity, icons were not associated with any particular medium, and were made, as occasion demanded, in a variety of materials: marble, ivory, chalcedony, mosaic, cloisonné enamel, silver, gold, and terra-cotta. Often, of course, icons did consist of paintings, but these were in fact just as likely to be frescoes or mosaics as panels.

As for size, ivories, naturally enough, tended to be small—those reproduced in *The Icon* range from about five to twelve inches in maximum height or breadth. The marbles and mosaics, on the other hand, were often monumental—one illustration shows a marble of the Virgin at prayer, made in Constantinople during the mid-11th century, which is six-and-a-half feet tall; and another, the enormous tenth-century mosaic of Christ in majesty which is still in place above a door of Istanbul's Hagia Sophia. However, during the 12th century, a renewed sense of mysticism took hold in the Eastern Orthodox Church, and as a consequence paintings, mosaics and cloisonné began to supplant three-dimensional forms be-



A 15th-century icon from Georgia, USSR, shows mounted St. George. Work, of cloisonné enamel, gives dragon flamboyant coat outshining raiment of saint.

cause they were considered less directly imitative of earthly reality and thus more spiritual.

Russia, moreover, was by no means the chief center of icon devotion, let alone the only one. The origins of the icon are to be found in Constantinople, established in A.D. 330 on the site of ancient Byzantium and named after the Roman emperor who for the first time made Christianity a lawful religion. From Constantinople the influence of the Byzantine style spread to all neighboring countries, particularly to the eastern Mediterranean, the Balkans and Russia. One of the few works in English ever to attempt a comprehensive survey of the entire field, *The Icon* is divided into different cultural spheres ranging geographically from Constantinople to Walachia and Moldavia, and temporally from the fifth to the 18th centuries.

While the images depicted in icons, emblems of unchanging truth, were not subject to individual interpretation, each cultural area tended to create its own style. Icons produced in Georgia were often marked by expressive emotion and gentleness, and those in Thessalonica by greater realism; certain works created in the Middle East during the Crusades, though Byzantine in character, betray the unmistakable influence of Western pictorial realism.

In *The Icon* the differences between these various schools are illuminatingly set forth, though the text betrays a certain inconsistency of approach. Apart from Weitzmann, who in addition to writing the introduction covers Constantinople and the Crusades, most of the contributors are Eastern European and, possibly for ideological reasons, take a more secular approach to the subject than Weitzmann does. However, the heart of the book consists of more than 300 color plates, many of them superb, notably those devoted to ivory carvings and metalwork. Some of the paintings, especially the details, have been fuzzily reproduced. Despite this, and the absence of both a list of illustrations and an index, *The Icon* has enough information, and beauty, to be recommended as a valuable and wide-ranging introduction to a fascinating subject.

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Unlike Keats' letters, which are sober and reflective, Byron's, except for occasional fleeting detours to ponder death, God, or old age, are generally unphilosophical. For the most part, he concerns himself with his own affairs—business, literary and, especially, amorous.

Byron pontificates on any subject. What should women eat and drink? "*. . . lobster sallad & Champagne,* the only truly feminine & becoming viands." "All men," he rages, "are intrinsical rascals—and I am only sorry that not being a dog I can't bite them.—" Poetry is "the lava of the imagination whose eruption prevents an earth-quake. . . ." Fortunately, "God will not be always a Tory." Venetian women, he muses, "*kiss* better than those of any other nation—which is notorious—and is attributed to the worship of images and to the early habit of osculation induced thereby."

Byron's descriptions of his love affairs are frank and outrageous, and often recall the plots of 18th-century comedies. At the same time that his host is boasting that for a certain sum he can win any woman, Byron is plotting the seduction of the man's wife. "Is not this . . . a perfect comedy?" Peasant as well as aristocratic

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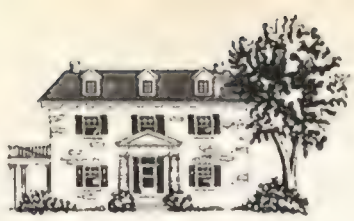

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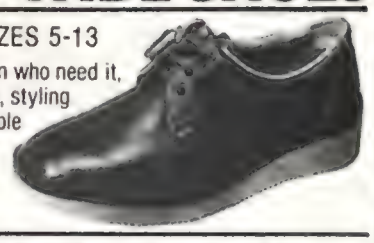

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Byron was 26 and already famed as a poet when this portrait was made in 1814.

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In these letters and journal extracts, Byron is seen in every mood: threatening his publisher; obstinately refusing to change one line in *Don Juan*; boasting about his swimming and riding; reviling the narrow, hypocritical British; defending himself; ridiculing; posing. Marchand has so wisely chosen that each entry fixes the writer in a revealing posture.

Along with *Byron: A Biography* and *Byron: A Portrait*, Marchand has made available what amounts to "Byron: An Autobiography and Self-Portrait." Marchand's scholarship is unobtrusive yet omnipresent: his introduction, biography of Byron and of the recipients of his letters, and the anthology of bons mots give the reader an unparalleled opportunity to enter into the mind of one of the most vibrant and celebrated poets of the 19th century. What Byron wrote about Robert Burns' unpublished letters accurately describes his own: "They are full of oaths and obscene songs. What an anti-ethical mind!—tenderness, roughness—delicacy, coarseness—sentiment, sensuality—soaring and grovelling, dirt and deity

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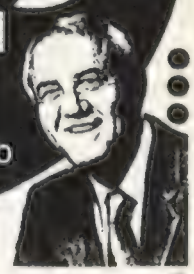

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Last Stands: Notes from Memory
Hilary Masters
David R. Godine, $14.95

Hilary Masters was lucky in his parents—difficult though they may have been—in a number of ways. One was that his father, the poet Edgar Lee Masters, who wrote *Spoon River Anthology*, was sufficiently well-known to enjoy a modest fame, but not brilliant enough to overshadow his son's own gifts. Second, they provided him with an unusual childhood spent hopping back and forth between Kansas City (where he lived most of the year with his grandparents) and New York City (specifically, a seedy suite of rooms his parents rented in the Chelsea Hotel), or a summer house in Columbia County, New York, and a boarding school in New Hampshire, and New York City again, and North Carolina where his mother got a teaching job, and Philadelphia and Providence . . . and so it went.

Children are quick, under such circumstances, to develop techniques of continuity, such as magnifying details to fill in an otherwise disconnected history. Yet it is this very disconnectedness which supplies the code for the fragile web of family reminiscences that Masters spins through time and space.

The most significant break occurs the day his grandmother, Mollie Coyne, is hit by a truck in downtown Kansas City. At first her injuries appear minor. "I'm all right," she keeps repeating to her grandson while, arm in sling, she directs him around the kitchen in order to get the chicken and potatoes done before her husband, flinty-eyed Tom, returns from work. At the supper table, Coyne—who meantime has heard about the accident—pointedly gives the account of a curiously similar event which he pretends to have gleaned from the local evening paper:

> 'She was crossing and this truck turned in on her and she never saw it coming,' he has continued as he looks over the dish of fried chicken, fork poised to spear a piece. 'Never saw it. More likely,' and his voice falters into a whistle, a thin whinny like a horse in the distance—a sound

Family snapshot of Hilary Masters and his grandfather was taken at Fort Custer.

that meant he had been touched by humor or pathos, and he does laugh abruptly; and continues: 'More likely she had been drinking beer.'

Drinking beer: in wounded dignity, "like a character in an O'Casey play," the grandmother rises from the table and walks to her bedroom where from then on "she turned her face to the wall like one of James' misunderstood heroines, her doom setting up around her . . . with the certainty of cement." The incident signals the end of Hilary's childhood.

Other breaks, woven together with threads of memory, are less pronounced. For instance, a taxi carrying mother and (now grown) son away from Arlington National Cemetery, where Tom Coyne has just been given a military funeral, suddenly becomes another cab in which the same pair are en route to the station, leaving Kansas City for good. Or a train speeding east from Petersburg, Illinois, in 1950 after Edgar Lee Masters' funeral, abruptly detours by way of Philadelphia (where the poet spent the last year and a half of his life in a nursing home), then back to the Chelsea Hotel in the summer of 1935.

It is the Chelsea sequence where memory, obviously steeped in imagination, creates the strongest reverberations. In those days in New York, a boy fresh from the Midwest could find no end of exotic

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diversions: the Automat down the street where "fabulous women" in change booths "seemingly without counting" spilled the correct amount of nickels, dimes, quarters; or the book collector upstairs who, even on sultry afternoons, stepped inside the elevator elegantly arrayed in spats, vest, cravat and "high luminous celluloid collars" on whose "glacial surface" a small bug once crawled "surefooted and obviously at home, paused at the top, and then dropped down the other side, out of sight." Young Masters was thrilled when his father, on rainy Sundays, would hand over a nickel for riding the Seventh Avenue subway back and forth; the cars smelled not unlike the basement of his grandparents' house (imagine it!), but offered far more in the way of mystery and adventure.

It was a time when one could reach into the American past and pluck out an anecdote about Annie Oakley by someone who had actually known her; could talk about Custer's Last Stand as though it had taken place yesterday; could speak of Abraham Lincoln as a real person rather than a figure inside a history book. It was a time when the words "Sioux" and "Cheyenne" could send shivers of apprehension through a small boy's frame; a time before the melting pot of the big city boiled over with frustration and rage—which perhaps accounts for the benign spirit pervading this book.

In fact, considering Hilary Masters' unorthodox childhood and the choleric temperament that he was heir to, it is surprising how little bile emerges. Maybe Tom Coyne used it all up as a young man routing desperadoes near Jackson Hole; or perhaps Hilary's mother, Ellen Coyne, expended it in her frantic effort to "get on with it" rather than stumbling over moments of self-pity.

Last Stands is a book to be savored on several counts: for its anecdotal richness, for its memory technique of crossing and crisscrossing lines of thought, for its nostalgic value in showing an America which no longer quite exists and, finally, for the beautiful way in which David Godine has printed and produced it.

Suzi Mee
New York poet and critic

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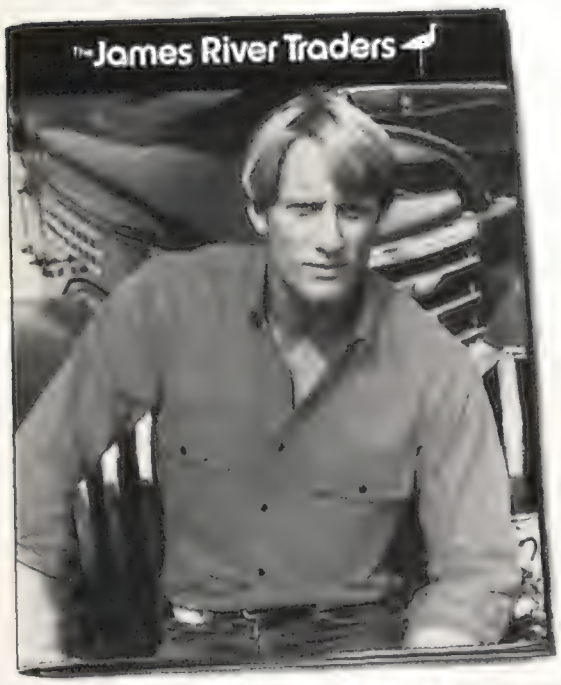

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Colorado River (p. 44)

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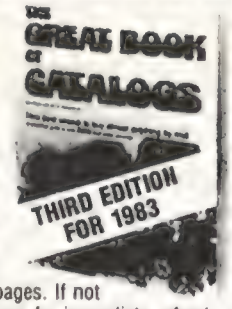

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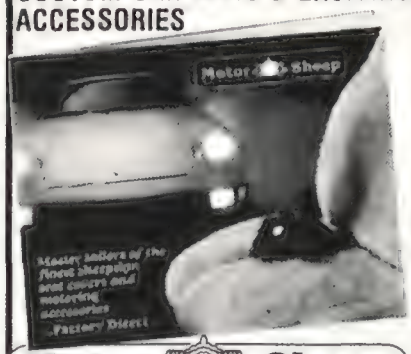

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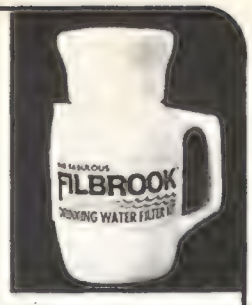

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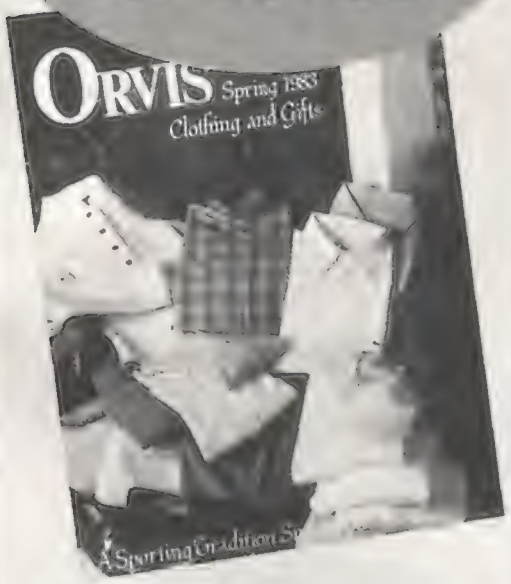

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Smithsonian highlights

Naturally proud of the Carnegie Mansion, home of the Smithsonian's Cooper-Hewitt Museum in New York City, the staff there decided to celebrate the building's 75th birthday by asking people to "embellish" a line drawing of its south facade, which they sent out upon request. The fanciful modifications that were returned by the likes of Jamie Wyeth, Art Buchwald, Robert Venturi, Chas. Addams and a host of others inspired *Carnegie Mansion "Embellishments,"* a show opening February 8 that presents 100 of the colorful and amusing responses.

Meanwhile, back at the Mall, the Museum of Natural History is unveiling its new diorama depicting the Burgess Shale underwater community of 530 million years ago (see *Highlights continued*); and is opening a major exhibition on February 11, *Contemporary Japanese Ceramics,* which contains 300 masterpieces.

Special February exhibits and events

National Museum of African Art
African Emblems of Status (through April 3).
What Price Beauty? (February 6; 3 P.M.) Lecture by Roslyn Walker examines traditional adornment practices.

National Portrait Gallery
Hollywood Portrait Photographers (February 3-March 21) More than 100 photographs documenting the Golden Era (1925-45) of Hollywood (see p. 100).
The Eight (opening February 3) Works by eight early 20th-century American artists led by Robert Henri.

National Museum of Natural History
Contemporary Japanese Ceramics (February 11-April 3) Three hundred masterpieces from the collection of Mme. Tomo Kikuchi of Tokyo.

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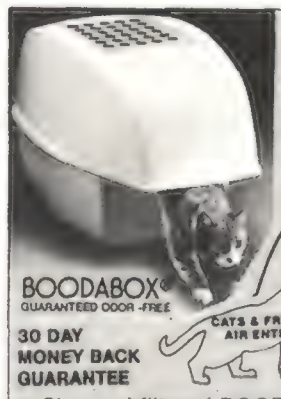

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Elizabeth Nourse, 1859-1938: A Salon Career (through April 17).

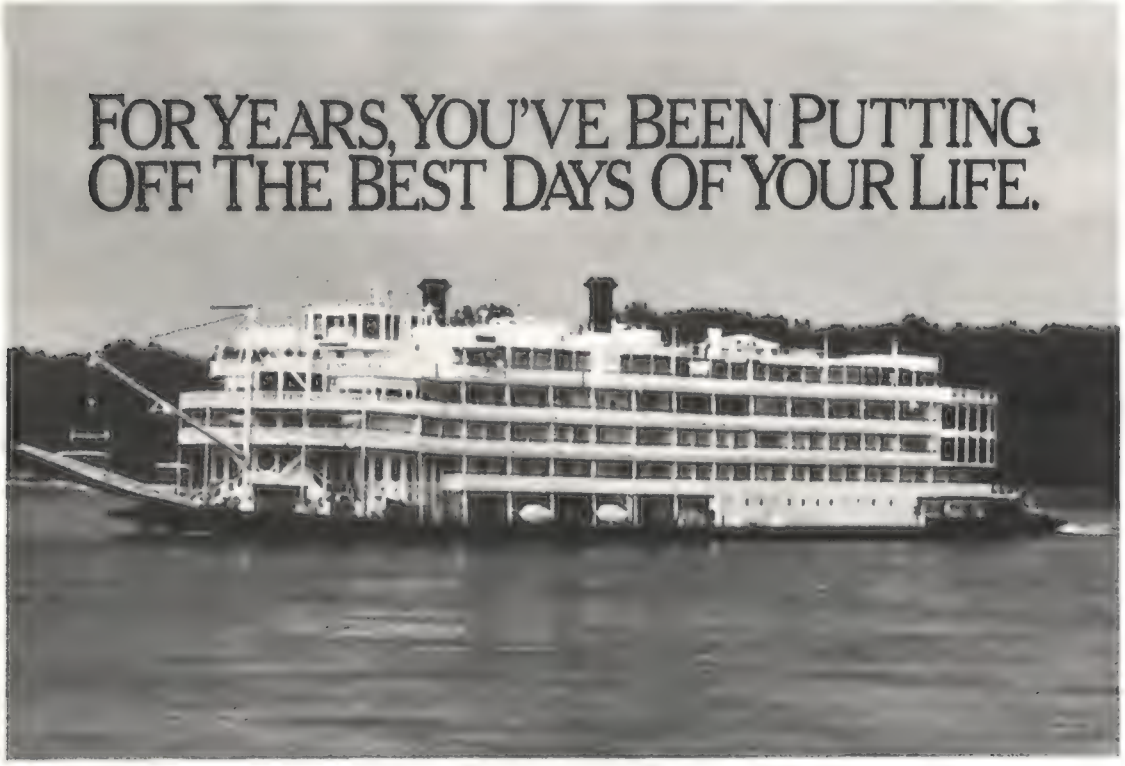
Renwick Gallery
Threads: Seven American Artists and Their Miniature Textile Pictures (through May 8) Exhibit of 26 tiny fiber artworks.

National Air and Space Museum
The Artist and the Space Shuttle: Selections from the NASA Art Program (through September 6) Ninety works by 40 artists (see p. 20).
The American Black in Aviation: A Symposium (February 25; 9 A.M.-4 P.M.) Speakers will include historians, black aviators.
Bull, Dog and Hunter (February 5; 9 A.M.) Monthly sky lecture.
Smokejumping (February 10; 7:30 P.M.) Lecture.

Cooper-Hewitt Museum (New York)
Carnegie Mansion "Embellishments" (February 8-May 1) Includes 100 fanciful entries (below).
Tiffany Studios: Metalwork and Other Decorative Arts (January 18-April 17).

Smithsonian events

For price information and tickets to Resident Associate Events, call 357-3030:
The Eight: The First American Art's Coming of Age (February 13) All-day seminar.
The Arts of Ancient China (February 5) All-day seminar with Robert Thorp.
The Best of Barrymore (February 1, 8, 15; 7:30 P.M.) Film series.
The Young 18th-Century Musician and Composer (February 13; 10:30 A.M.) Special Sunday morning concert.



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Star Gods of the Ancient Americas (February 24; 8 P.M.) Slide lecture by art historian Susan Milbrath.

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Guests will be greeted by a Scottish piper at the Smithsonian castle for a reception and dinner before the opera, followed by a champagne reception at the Watergate Hotel. Other activities include performances and demonstrations on historic musical instruments of the Smithsonian, dinner at the National Portrait Gallery, lunch on a mule-drawn canal barge, and afternoon tea at an embassy. For details write: Musical Weekend, Room 4124, NMAH, Smithsonian, Washington, D.C. 20560.

Regional Events Program

More than 40,000 Associates in California will have the opportunity to meet Smithsonian curators and scientists when the Regional Events Program visits Oakland and San Diego March 1-12. The program, which features lectures and seminars on such topics as "The Mystery of the Giant Squid," "Volcanology Today" and "Twenty-Five Years of Space Exploration," is designed to acquaint Associates living outside Washington, D.C., with current Smithsonian research. Associates in these cities should have received invitations by now. Contributing members will also be invited to attend special receptions during the series. For further information, write: Regional Events Program, A&I 1208, Smithsonian, Washington, D.C. 20560.

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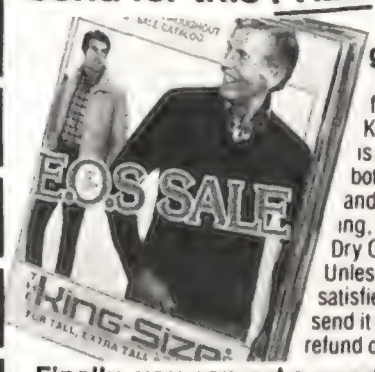

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facility at Silver Hill, Maryland, are among February listings for Radio Smithsonian. To find out which stations in your area carry these programs, write: Smithsonian Office of Telecommunications, MNH Room C222B, Washington, D.C. 20560.

Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibits to hundreds of cities outside Washington. To sponsor a show in your community, write: SITES, Smithsonian, Washington, D.C. 20560. Here are some February exhibitions:

Monterey, California (February 26-April 3) *Ethiopia: The Christian Art of an African Nation,* Monterey Peninsula Museum of Art.

Bridgeport, Connecticut (February 5-March 6) *Contemporary German Textile Art,* Museum of Art.

Wilmington, Delaware (February 5-March 6) *John Sloan in Santa Fe,* Delaware Art Museum.

Santa Ana, California (February 26-April 10) *Inua: Spirit World of the Bering Sea Eskimo,* Charles W. Bowers Memorial Museum.

Evanston, Illinois (February 26-March 27) *The Lithographs of James McNeill Whistler,* Terra Museum of American Art.

Wichita, Kansas (February 26-March 27) *Images of Labor,* Wichita State University Ulrich Gallery.

Logan, Kansas (February 19-April 3) *Treasure of the Quicksilver Galleons,* Dane G. Hansen Memorial Museum.

Columbus, Mississippi (February 12-March 13) *Children's Art from the People's Republic of China,* D. D. Patty Museum.

Tyler, Texas (February 12-March 27) *Invisible Light,* Tyler Museum of Art.

Membership benefits

Most Smithsonian museums are open 10 A.M. to 5:30 P.M. As members you are invited to begin your visit at the Associates Reception Desk in the castle, where a warm welcome and special printed materials await you, 10 A.M. to 4 P.M. daily. Additional benefits include a half-hour slide-lecture orientation to the 13 Smithsonian museums; dining in the members' restaurant, The Court; and discounts in most Smithsonian shops.

For a free previsit information packet, send postcard request to Associates' Reception Center, Smithsonian Institution. Washington, D.C. 20560, or phone (202) 357-2700; for hearing impaired, TDD (202) 357-1729. Please allow two weeks for receipt.

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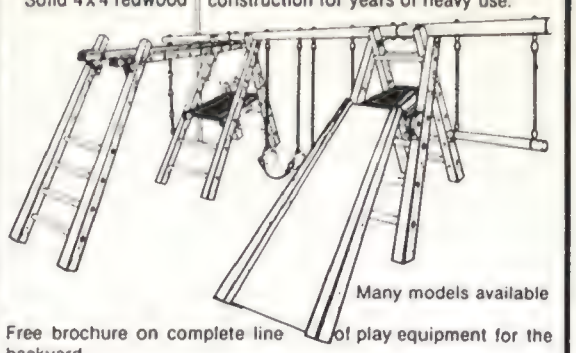

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Creatures from the black lagoon

Some 530 million years ago, in Paleozoic times, a series of mud slides along the base of an underwater reef spelled out doom for the thriving community of critters, many of them soft-bodied, that dwelt there. A long time later, specifically 529,999,926 years later, in the autumn of 1909, Smithsonian Secretary Charles Walcott stooped over to pick up a block of shale that had fallen onto a mountain path in western Canada (SMITHSONIAN, March 1971). Splitting the rock open, he saw the evidence of the animals' demise—a collection of fossils so weird as to make sci-fi visions of space animals seem tame. Now, 25 creatures have been re-created for the Burgess Shale diorama, a new permanent exhibit at the Museum of Natural History. The reconstructions are based on study of the fossils by a British team of scientists led by H. B. Whittington.

Fossils of soft-bodied animals are few and far between; they simply didn't hold up as well over the millennia as the hard parts of animals, such as shells and external skeletons. So when study of Walcott's specimens revealed a whopping ten previously unknown phyla (there are about 30 phyla of animals living today), there was much excitement.

Paleontologists must have had a few fitful nights after pondering these little marine invertebrates, with their odd, early forms of adaptation. Consider, for example, *Opabinia* (bottom right), which hovered just above the sea floor, watching with its five eyes for a worm or other prey, then grabbing its catch with a trunklike organ. Or *Marrella* (center left), looking like a lacy apparition with its wedge-shaped head bearing two pairs of long, curved spines, and its body covered with feathery appendages and gills. Perhaps the strangest of all (center right), the only known representative of a previously unsuspected phylum, is an animal that walked on seven pairs of pointed stilts and had seven tentacles rising above its body; they may have been "arms" or "mouths"—the paleontologists can only guess. They named this one *Hallucigenia*, citing "the bizarre and dreamlike appearance of the animal."

Constance Bond

Photographs by Chip Clark

Burgess Shale diorama at MNH re-creates 530-million-year-old underwater life.

Arthropod *Marrella* swept food particles to its mouth with feathery appendages.

Sidneyia (top) was named for Walcott's son, who discovered the fossil in 1910.

Aptly named *Hallucigenia*: seven pairs of stiltlike legs, seven tentacles on back.

Four-inch-long *Opabinia*, staying close to bottom, held prey with long "trunk."

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Domestic Study Tours

Hawaii February 27-March 12: Camp on secluded beaches and enjoy the solitude and beauty of these islands.

Okefenokee Swamp March 26-April 2: Canoe through this beautiful primeval refuge with its moss-draped cypress trees and array of springtime flowers.

New Orleans April 10-17 or April 17-24: Learn about the area's history, architecture and cuisine.

Big Bend April 13-22: Hike the spectacular trails in this southwest Texas wilderness.

Washington, D.C.: Power and Style April 26-May 1: Spend a day in Congress; visit charming neighborhoods, historic sites and museums with local guides.

Baja California April 29-May 8: Adventure cruise in the Gulf of California. Observe whales and dolphins plus the nesting birds of the Midriff Islands.

Crafts Today May 5-8: A seminar for the novice and experienced collector held in conjunction with the first Washington, D.C., Crafts Show.

Kentucky Bluegrass May 12-19: Visit historic homes and horse farms in Louisville, Lexington and Shakertown to discover the area's rich heritage.

Florida Keys May 13-23: Travel from Miami to Key West on this active outdoor tour of snorkeling and canoeing. Includes two-night boat trip to the Dry Tortugas.

Wines of Napa and Sonoma May 22-28: In-depth study of California wines includes discussions with wine masters and special comparative tastings.

Southwest Archaeology May 28-June 6: Camping trip includes Mesa Verde, Monument Valley and river rafting.

San Juan River June 8-16: Spectacular scenery and an exciting white-water trip through the canyons of southeastern Utah.

Treasure-Houses of Early America June 12-18: Architecture and decorative arts at Winterthur, New Castle, Brandywine area.

Glacier/Waterton National Parks July 10-19 or July 20-29: Hike through awesome scenery with overnights at park lodges.

Desolation and Gray Canyons July 21-31: A white-water trip for the adventurous on Utah's Green River.

Colorado Rockies August 7-13: Dig for fossils, visit alpine meadows, and explore 6,000-acre outdoor classroom in the shadow of Pikes Peak.

Washington "Anytime" Weekend: Brighten your winter with a visit to your choice of Smithsonian museums. Package includes hotels, meals, Tourmobile, and exclusive tour of Smithsonian castle. Application and payment must be received at least ten days prior to arrival.

Foreign Study Tours

These tours range in size from small group experiences to charter adventures and vary in price from low cost to deluxe, depending on the type of travel, destination visited and length of trip:

People's Republic of China 1983: Follow the Silk Route, climb China's sacred peaks, cruise the Grand Canal, explore the back roads, study decorative arts and antiques, or journey from Paris to Beijing by train. Exclusive tours are led by a Sinologist and include intensive pre-tour briefing.

India Wildlife Safari February 5- March 2: Travel by elephant and jeep to observe rare species of birds and animals. Includes Kathmandu and Tiger Tops. Bombay, Delhi and the Taj Mahal.

Caribbean Study Voyage February 11-20: The tall ship *Sea Cloud* sails through the Lesser Antilles with fascinating scenes of lush forested mountains, colorful towns and remote coves and beaches.

Red Sea Passage February 23-March 7: Sail from Suez on the *Argonaut* to visit Karnak, Luxor, Valley of the Kings, Abu Simbel in Egypt and Petra in Jordan. Tour Cairo's mosques and bazaars, the Sphinx and pyramids of Giza.

Indonesia March 26-April 15: Cruise beyond the ordinary to the islands of the Java Sea, including Bali and Komodo. Study natural history and traditional crafts; observe local customs and rituals. Visit Singapore and Hong Kong.

Canals and Old Masters April 14-28: Art museums, historic tours and spring flowers highlight a four-day stay in Amsterdam. From Arnhem, sail on rivers of Holland and Belgium, ending with visits to Bruges, Ghent, Antwerp and Brussels.

Rouen and the Norman Countryside April 16-May 1 or October 1-16: The ancient city of Rouen provides a superb setting for a program of walking tours, museum visits and special excursions nearby, including Norman churches, elegant beach resorts and Monet's Giverny.

Russia May 6-21: Leningrad, Moscow and Riga: See the Hermitage, the Kremlin and other fabulous museums, palaces and landmarks. Visit schools, factories, clinics and enjoy the best of Russian theater.

Ecuador and the Galápagos Islands May 8-20: After visiting Quito and the Andean countryside, board the *Santa Cruz* for a study voyage to Darwin's famed islands.

Seminar in Florence May 13-29: Study the Florentine Renaissance while living in a 15th-century villa. Attend lectures, field trips, Italian language classes and special evening activities.

Odyssey of Flight May 22-June 6: An exciting opportunity to visit the Paris Air Show, the Musée de l'Air, Britain's Shuttleworth Collection and more with experts from the National Air and Space Museum.

Alpine Countryside May 28-June 12 or September 10-25: Study folk art and architecture, flora, fauna and geology in a charming Austrian mountain village.

Wild Highlands of Scotland June 2-19: Based in a castle, observe shy wildlife and the brooding landscapes of loch and moor. Visit the Isle of Skye and meet local residents to learn about the region.

Cotswolds Countryside June 26-July 11 or July 10-24: Archaeological sites, market towns, woolen mills and historic homes in this quiet corner of old England.

European Waterways July 12-24: After two days in Paris, board the *Argonaut* in Rouen. Visit museums in Bruges and Amsterdam before cruising the Kiel Canal to Copenhagen.

Paris and Provinces August 28-September 11: Six days in Paris followed by excursion to Provence or Burgundy.

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Selected Studies Seminars

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Passion and Power: Baroque Art March 13-18: The stunning array of painting, sculpture and architecture that flowered in Italy and Spain. William Kloss coordinates the lectures on artists of genius including Caravaggio, Bernini and Velazquez with tours of the major loan exhibition "Painting in Naples from Caravaggio to Luca Giordano" at the National Gallery of Art.

Genealogical Research March 13-18: Learn from leading authorities how to trace your family history.

Contemporary Book Publishing March 20-25: The director and staff of the Smithsonian Institution Press and guest experts highlight new developments in editing, design, production and marketing. Includes lectures by a leading author, bookseller, agent and publishing executive and tours of firms.

French Impressionist Painting March 27-April 1: Lectures and tours with William Kloss of the masterpieces by Monet, Degas, Renoir and others in the famous collections of Washington's museums.

The Golden Age of Flight April 10-15: The National Air and Space Museum staff and well-known authors focus on the sensational record flights and the countless companies that boomed or busted in the period between the wars. Includes tours of the surviving aircraft.

Chinese Ceramics April 24-29: Connoisseurship of the timeless beauty and outstanding craftsmanship of renowned masterpieces. Highlights exquisite export wares, enameled porcelains, recent discoveries, dating controversies, detection of fakes and the market today.

Quilting with the Experts May 15-20: Intensive workshops with Maria McCormick-Snyder, Jeffrey Gutcheon and Mary Penders. Includes "Color and Design," "Precision Piecing," "Log Cabin Variations," "Creative Hand Quilting" and "Sampler Quilts."

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By Israel Shenker

Notes on terminal indecision: 'Sincerely' or 'Cordially' or 'Yours till angels smile'?

It began, of course, with a letter to *The Times* of London. Mrs. Jan Pahl wrote from Canterbury to say that the English language was "a subtle and flexible instrument, but it does have various lacunae." She wondered how to end a letter with a phrase conveying the idea of "in friendship" or "with warm and friendly feelings." "Love from" appeared to her naive, "With kind regards" was excessively formal, "Best wishes" redolent of Christmas cards, "Yours ever" farfetched.

No one who has ever been chilled by the stiffness of "Sincerely" or paused at the end of a thank-you note, buffeted by waves of terminal indecision, could remain indifferent to Mrs. Pahl's distress. I took pen in hand. Then I put it down again. *The Times* is a journal of august tradition, its letters page a theater for gracious, often erudite discourse. Did I want this select audience to see *my* naked lacunae, unadorned by so much as a fig leaf of learning? I would first consult a library of clerical experts, massed pastors of decorum.

Samuel Johnson, learned beyond measure and discursive beyond belief, threw himself generously into the form: "More news I have not to tell you, and therefore you must be contented with hearing, what I know not whether you much wish to hear, that I am, Sir, your most humble servant." His friend Sir Joshua Reynolds painted more economically, signing his compositions to one intimate: "From your slave." Jonathan Swift, no less captivated by Mistress Stella's twin charms, concluded: "So good night, myownlittledearsaucyinsolentrogues."

How very distant that was from the chaste modesty of the beloved essayist Charles Lamb, who shyly descended to the foot of the page to whisper: "I have scarce room to put in Mary's kind love, and my poor name, C. Lamb."

I turned to a volume in the practical series, *Hand Books for Home Improvement*, anno 1857, only to find confusion assailing even Sir Walter Scott's faithful Charlotte Carpenter. She knew exactly what she felt about him, but could not find quite the words: "With all my love, and that sort of pretty things, adieu." If perplexity communicated itself to Sir Walter he never said so, though in his writing he addressed himself to just about everything else, and therefore wound up: "Yours, at length."

From the Crimea, Florence Nightingale had no patience with the canons of convention. Writing by lamplight, she exploded: "Ever yours furiously."

"Damn the torpedoes!" also appeared to be the sentiment of Admiral John Arbuthnot Fisher, the Royal Navy's First Sea Lord in 1914. His short-fused epistolary salvos included: "Yours till a cinder, Yours till the angels smile on us, Yours till death, Yours till Hell freezes."

Lord Fisher's valedictories came direct to *The Times* from Vice-Admiral Sir Louis Le Bailly. In fact, while I was dithering from book to book, responses to Mrs. Pahl's *cri de correspondance* were appearing almost daily. One authority revealed that in Barotseland all official letters to the local African chief concluded: "I am your friend."

The Under-Sheriff of London recalled that a pregnant woman seeking an excuse from jury duty signed: "Yours expectantly." A doctor in Mrs. Pahl's own Canterbury wrote of an "attentive student" who used to conclude her billets-doux to him: "Yours eventually."

It was an educator from the University of Hull who taught the last lesson of the correspondence course. He suggested ending letters as Victorians did, "by giving a final encore to the dominant theme or delicately reiterating the emotional gist: by, for example, 'Yours in great distress of mind' or 'Yours in heartfelt gratitude and relief.' In this way we can, so to speak, round off our letters pointedly. Yours in earnest hope of publication, R. W. K. Paterson."

The Times smiled on that stratagem, but I was unwilling to consider the problem solved. And turning to that incomparable litterateur, the late Max Beerbohm, I discovered that he, too, once contemplated writing to *The Times*. He prepared learned references, formulas of courtesy, avowals of humility and, finally, having exhausted the artifices of procrastination, conceived the perfect beginning: "I am, sir, your obedient servant."

"Good!" he said to himself, took his pen in hand, wrote out that conclusion, and then continued the letter backwards.

Marveling at his ingenuity, I proceeded to further volumes of a great writer's letters. My spirits sank when I found a warm missive to actress Alma Murray ending: "Yours—(my kingdom for the right word!) G. Bernard Shaw."

Shaw, of mind so nimble and fingers so fleet, at a loss for words! If *he* failed, what hope was there for yours truly?

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